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President of the Hawaiian Sugar Planters' Association,
1892-3 and 4 and 1902.

NEW YORK SUGAR MARKET, April 24.—Raws show a net advance of 1-16c. Centrifugals 3.44c., granulated 4.50c. Willett & Gray's statistical of April 24 says: The week under review has been devoid of interest, while waiting action of Congress on the Cuban question. The British Government has made no change in its sugar duties, and speculators are left with large stocks of sugars on their hands.

The Brussels Sugar Convention agreed that sugar bounties should be abolished, but no definite result can be secured until their action is approved by the various European governments. The probabilities are in favor of ratification—which may be made during the next twelve or eighteen months.

It is not easy to ascertain the exact status of the changes made in the European sugar bounty laws. A convention has been agreed to, the purport of which is that in the course of a year the present rates shall terminate, and a system of countervailing duties introduced, but what the result will be on the demand and consumption of sugar does not appear. There seems to be much jealousy between the European nations—a fear lest one may secure some advantage over the other. Whether there will be an increased consumption of sugar in Europe remains to be seen. If the price of sugar is reduced in all the European countries, so as to allow this, increased consumption must follow in proportion to the amount of reduction. For years past, the poorer classes in Europe have been deprived of the free use of sugar as has existed for the past ten years in America and England. At all events, a step has been taken in the right direction, though the results may not appear for some time to come.

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NEW SUGAR REFINERY PROPOSED.

The Seattle papers have been advocating the erection of a sugar refinery at or near that city, to supply the trade around and north of that place. It requires a large capital for this undertaking, and it is very doubtful whether it would prove successful, in competition with the refinery at San Francisco. The Post Intelligence, in discussing the question, thinks that there is a fine opening there to supply the local trade, and says: "The Makee Sugar Company, a large corporation having plantations on the island of Kauai, which is independent of the Spreckelses, is now figuring on shipping its crop to New York by way of Seattle. If the Globe Navigation Company, now operating a line of steamships from Seattle to Hawaii, will extend its line to Kauai and take this sugar on board there, and if the transcontinental railroads will make a reasonable rate to New York, it is figured that the Makee Company can make more by shipping in this manner to the East than attempting to market its product in San Francisco.

While this may be true, it is evident that there is a much better solution. If raw sugar can be shipped to Seattle at a cheaper rate than to San Francisco from the plantations on Kauai, it would certainly seem that a sugar refinery located here could readily compete with the Spreckels concerns located in California. At present San Francisco is the coast center of the sugar trade. All the refined sugar used on the coast has to pay freight charges from San Francisco. Seattle is the distributing point for an immense amount of sugar under present conditions, our jobbers buying in San Francisco, and paying the freight from that point to Seattle. From these considerations it would appear that a sugar refinery at Seattle would be a paying business proposition."

With the San Francisco Sugar Refinery now covering the whole field of the Pacific coast, from Mexico to Alaska, it is very doubtful whether a new refinery, established at Seattle or any other point on the coast would be able to compete successfully in such a venture, which involves the outlay of an immense capital and great risks.

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An Australian is said to have invented a machine to top and harvest cane. Like many other cane cutting implements, it is probably not perfected and may never be. Such machines are at best clumsy substitutes, and one after another are relegated to the scrap iron pile. The harvesting of cane is a laborious task, and from its very nature no machine can do the work so well and economically as the human hand. When cane is fully ripe, the stalks fall in every direction, and only the human eye and hand can direct the knife to the spot where the stalk should be cut, to furnish the most sap, which is richest near the ground. Machines can no doubt be constructed to cut cane, but not to be of any service where it lies as it often does here with the stalks piled in every direction—almost a compact mass two feet in depth.

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CONCERNING ROAD-MAKING.

We call special attention to an article in this issue, relative to road-making. It is written by a man who has had experience in making the roads in Los Angeles, some of the roads in which city are very fine, and the making of them has only been accomplished after several years' experience. Now we think that we possess better natural material for making good oil roads than any other country. And this is our black volcanic sand. It has not yet been tested with oil, but the fact that it makes the best roads that we now possess, would indicate that with the combination of crude oil, it may be found to furnish a perfect road. Richards street, from King to Beretania, was made with this material (black sand) and it has served to give a smooth road for several years, with little

or no repairs. It is true that it has been less used for heavy traffic than other streets, but it has required very little mending. We need better roads than we now have, and may gain by the experience of cities on the mainland. So far as we can learn, wherever roads have been properly constructed with crude coal oil—the same substance that is now being imported for fuel in our sugar factories—it would seem that no better time could be chosen to make a trial than now. But the main thing is to learn how to do it properly,—so as to make a success from the start.

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LOUISIANA PURCHASE EXPOSITION—1904.

The St. Louis World's Fair will be approximately twice as big as any former international exposition.

The Centennial Exposition at Philadelphia covered 236 acres, the Paris Exposition of 1899-1900, 336 acres, the Columbian Exposition at Chicago 633 acres, the Pan-American at Buffalo 350 acres.

The St. Louis World's Fair will cover 1,200 acres.

The construction cost of the Paris Exposition was $9,000,000, that of the Columbian Exposition $18,322,000, and the total cost of the Pan-American Exposition was $10,000,000.

The estimated cost of the St. Louis World's Fair will be $30,000,000. This will mean $40,000,000 by the time the work is completed.

Before the Exposition gates are open, May 1, 1903, the city of St. Louis will have expended the enormous sum of $20,000,000. Of this amount, $5,000,000 was appropriated for the fair through the Municipal Assembly, her citizens raised $5,000,000 additional by private subscription, and by popular vote at a special election October 22, the charter amendments were carried, which will enable the city to expend $10,000,000 for street paving and other public improvements.—La. Sugar Pl. Jour.

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FUEL OIL FOR BAGASSE FURNACES.

The following article on the above topic, is of special interest to our planters, who are about to change from coal to fuel oil. It contains points which we have not before seen so clearly stated, and which should be known to all who are making the change. It is from the Louisiana Planter:

The subject of burning bagasse in connection with fuel oil is indeed an interesting one. At present, it is of vital importance to our sugar planters. Bagasse generates a certain proportion of the steam necessary for operating the sugar house. The question arises whether it is more economical to burn bagasse in connection with fuel oil, or to burn each in separate furnaces. In the following paper, I shall, from

practical experience of last season, when I superintended the erection and operation of the boiler plant of a large sugar house, operated exclusively with oil and bagasse, no provision having been made for any other fuel, endeavor to show why it is more economical to burn the oil in connection with the bagasse.

There was a radical departure from the Louisiana method of constructing the sugar house boiler plant at Lakeside, Texas. All the boilers were erected with distributing bagasse furnaces, feeding bagasse directly under them. Two boilers were placed in each battery, and the plant consisted of twelve return tubular boilers of 110 horse-power each. As before mentioned, the plant depended entirely on bagasse and oil for steam, as neither wood nor coal had been provided for. Oil was used when the mills were stopped, and bagasse and oil together when they were running. The oil was burned directly among the scattered bagasse thrown from the scatterers. As the finer bagasse ignited in suspension, it assisted the oil in combustion with the hot fire from the burning bagasse, which covered the entire grate surface, common with this distributing type of bagasse burner. When there was not sufficient bagasse for all the burners, we found it more economical to burn oil and bagasse together, than oil alone, which we could do by using enough bagasse for a certain number of boilers, and the balance with oil. Abundance of steam was furnished to run the house at all times, and the boiler plant ran without interruption, being a complete success in every respect. There was no smoke from the stacks when burning the two fuels together, and the labor used was trifling for operating the boiler plant. The consumption of oil taken for two tests, was less than seventy barrels of oil for eight hundred tons of cane when grinding for twenty-four hours.

My experience at Lakeside was that it is the proper method for getting the most satisfactory results from bagasse and oil from an economical standpoint.

The oil burners were located properly in the furnaces, and accomplished very satisfactory work. They were placed so as to come directly in contact with the bagasse, and not to throw the flame over the bagasse or around it as was done in many cases elsewhere. Several engineers of well known ability stated that it is impossible to burn bagasse and oil with the hopper system economically, as the accumulated piles of bagasse smother the flames, and prevent the oil burners from igniting.

Profiting by my experience at Lakeside factory, where I spent nearly the whole winter, watching results from this new method of burning oil and bagasse together, I would without hesitancy, as a practical and mechanical sugar house engineer, recommend its adoption from an economical stand-

point. Great credit is due the St. Louis people, owners of the Lakeside sugar factory, and their efficient superintendent, Mr. C. T. Raynor, for their unswerving confidence in the success of this new method of combined fuel oil and bagasse furnaces, and for relying on these fuels for operating their large plant, the operation of which was more than satisfactory.

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FOOD FROM SAWDUST AND MELASSE IN GERMANY.—In the rational economics of the farmer, science and modern technic play a great part. The observation has frequently been made that animals have a decided liking for young shoots and roots of shrubs, as well as the stems of indian-corn and sunflower stalks, all of which are easily digested. Experiments of long standing have proven that the nutriment contained in the shoots remains the same after they become wood. When certain chemicals—salt and calcareous water—are added to sawdust or ground corn cobs and stalks that have undergone a certain fermenting process, the resultant product is a food for animals that is easily assimilated and digested, and is liked by cattle, horses, sheep, and pigs. The valuable properties of this prepared food are based upon the nutritious matter contained in the wood (which is set free by the fermenting process), mixed with a large percentage of melasse. The nutritious matter in stems of indian-corn and sunflower stalks, if prepared, is proportionately larger. It is evident that a very cheap cattle food can be prepared in this manner, to which may be added potato peelings, husks and shells of grains, and from 70 to 80 per cent of melasse, which will be absorbed by the prepared sawdust. The aforementioned "Torfmelasse" contains but from 20 to 25 per cent. of melasse. The nourishing qualities of melasse for animals have been known to agriculture, but on account of its slimy condition it could not be properly utilized.—U. S. Consular Reports.

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OIL FOR ROADS.

By Hon. O. W. Longdon, Supervisor, Los Angeles County, Cal.

"Los Angeles was the first to experiment with oil on roads, oiling six miles in 1898, thirteen miles in 1899, fifty miles in 1900, and one hundred and ten miles in 1901. This was the mileage done by the board of supervisors, and does not include work done in the various incorporated cities of the county.

"Oil was first used on our roads with the sole object of laying the dust and making travel pleasant during the summer season. But we soon saw that we had something more than a dust-layer; in fact, a road repairer and a road-builder.

"Formerly, the custom was to grade roads during the winter months, and let them go to pieces during the long dry season, then regrade the following year, and so on—with the

result that we seldom had a good road anywhere for two consecutive months in the year.

"Now, we devote a great deal of care to the preparation of our road bed, cutting and filling uneven grades as required, grading to a good crown to insure proper drainage, and, where culverts are necessary, we build them of stone, concrete or pipe; and where material is to be had and the road bed seems to demand it, we surface the road with decomposed granite, or other coarse gravel. Our theory is, to build our roads as good as conditions will allow, and then take care of them; and it is in the care of our roads during the summer months, that we find the greatest benefit from the use of oil.

"Oil lays the dust. It is superior to water, in that, when properly applied, it is lasting, costs less, makes a desirable road, and can be used in districts where water cannot be had.

"It coats the road with the wearing surface that needs but slight attention to keep in good repair. It enables us to build up weak places, where water finds and increases the number of chuck-holes. Oil soaks in and remains a part of the road, while the mud caused by sprinkling with water, sticks to the wheels and water evaporates.

"When our road bed is in shape, we apply the oil hot, by means of either the DeCamp or the White machines, or a spray, manufactured for Supervisor Wilson, which is attached to old watering carts, and gives very good results. The hotter the oil, the quicker it unites with the dust and the more readily it is absorbed by the road surface.

"On most of our roads, we oil a strip twelve feet wide. In a few exceptional cases, we have oiled a strip eighteen feet in width. At the first application we use all the oil the road's surface will absorb. The quantity varies, however, according to the kind of soil and the condition of the road's surface, from 60 barrels on a well packed mesa road to 200 barrels on a light sandy road, per mile.

"The first year a road is oiled two and sometimes three times, the second and third oiling being very light. The second year one light application as a rule is required, except on roads that have very heavy traffic, and such roads have to be renewed every year as in wet weather the heavy traffic breaks and destroys the oil crust.

"When one or more tanks of oil have been distributed on the road the man doing the work proceeds to stir the oil and the loose material of the road surface, by driving back and forth over the oiled strip with a harrow or with the drags of the DeCamp machine. This mixing incorporates thoroughly the dust and oil spreading it evenly over the road's surface. All sloppy streaks or puddles of oil which are the result of hard spots in the road or of too much oil we cover with sand

or dust from the roadside, throwing on with a shovel sufficient loose material to absorb the surplus oil. The more thorough the union of the dust and oil the less complaint from the public when traveling on a newly oiled road.

"A loose, dusty surface is as necessary for the successful application of oil as a good foundation is necessary to make it lasting. Cold oil rolls up into balls and will not take kindly to the dust nor spread evenly over the road. It sticks to everything except the road bed. This applies to cold oil on roads which must be used for travel immediately after the oil is applied. We have all observed, however, that cold oil if spread on the ground and left undisturbed will in time harden into a beautiful asphalt surface. How to get this result on our roads and not close them to the public, is a problem not yet solved. The heavy oils, carrying from 25 to 50 per cent. of asphaltum have given the best results, the light gravity oils being not much better than water, on account of their tendency to evaporate.

"The oil costs us 50 cents per bbl. in Los Angeles, and will average 25 cents additional distributed on the road, thus making our roads cost us from $50 to $150 per mile the first year. The cost of maintenance during the following years is much less per year, varying with the soil, condition of the road, and volume of the traffic. Oil will lay the dust and improve the surface of a road on any kind of soil in dry weather; but oil, clay and heavy travel made a most disagreeable road in wet weather. I believe, however, that a well drained clay road covered with oil and heavily coated with sand, will make a good all-the-year road.

"The best results from oil have been obtained from mesa roads, composed of sandy and gravelly loams and decomposed granite.

"Old roads that have been sprinkled for years with poor results have been put in good condition with one or two applications of oil.

"We have found that we can not only repair our oiled roads with oil, but that it is the best material with which to mend chucks and ruts in our other roads. Mixed with the soil of almost any road it will stay when packed in a depression.

"The following are among the essentials for making and maintaining good oiled roads, viz:

"A well graded road, packed by winter rains or by thorough rolling.

"Oil as soon as there is sufficient dust on the roads, in the late spring or early summer.

"Oil often enough and with sufficient quantity to make it pack.

"Apply the oil when the weather is hot.

"Re-oil dry places to prevent chucks.

"Occasional going over the road with a plank drag helps it where the traffic is inclined to wear ruts in the road.

"Have the road foreman keep a few barrels of oil on hand with which to repair chuck-holes and weak places.

"A little oil and a hand-rake will work wonders in the imperfections of an oiled road.

"In my opinion the oiling of roads in this country is yet in its infancy. I believe that we shall improve our methods and our appliances for doing the work; and that an increasing proportion of our road money will be used for oil.

"Good roads, free from dust and chuckholes are demanded at this time, and no one thing so cheaply produces this result as oil. Not only is this dustless condition of benefit to the travelers on our public roads but the horticulturists located along our oiled roads receive even greater benefit by reason of the protection to their trees against constant showers of dust which otherwise would fall upon the foliage, strangulate the leaf function, and injure the crop.

"The protests against oil roads have almost disappeared. The demand for them is steadily increasing."

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THE GERMAN SUGAR SYNDICATES.

In Germany there are two sugar syndicates and one Kartel:

1. The German Sugar Syndicate.
2. The Syndicate of German Sugar Refiners.
3. The Kartel, or "combination advantage."

1. Consists of manufacturers of raw sugar from the beet manufacturers of refined sugar direct from the beet, and the manufacturers of refined from the raw sugar.

2. Consists of sugar refiners from raw sugar and refiners direct from the beet, and this Syndicate (2) guarantees to the members of Syndicate (1) a certain minimum price whenever the market price of raw sugar falls below a certain level.

This level, or normal price, is $2.78 per 100 lbs. The guarantee does not extend below a market price of $2.04 per 100 lbs. Below $2.04 or above $2.78, Syndicate (1) gets nothing. At a market price of $2.04 or below Syndicate (1) gets the full difference between $2.04 and $2.78 per lb., or $0.78 per 100 lbs.

Every month the members of Syndicate (2) pay into Syndicate (2) the amount due under arrangement (4), plus 10 per cent., which ten per cent is to cover the expenses of conducting the Kartel (3). The entire sum thus collected forms the combination advantage, or Kartel (3).

In detail, every month the members of Syndicate (2) pay into Syndicate (2) the difference between $2.78 per 100 lbs. and the average monthly price of raw beet sugar in Magdeburg for the month, on every pound of raw sugar delivered at

their refineries and turned into refined and sold for consumption (but not for export) and plus ten per cent. on said amount.

Suppose the average market price for any month for raw sugar is $2.31 per 100 lbs., and a refiner produced 1,000,000 lbs. refined and sold it for consumption in Germany and produced 2,000,000 lbs. refined for export to England or the United States, he would pay into his Syndicate (2) the difference between $2.31 per 100 lbs. and $2.78 per 100 lbs. say $0.47 per 100 lbs., plus 10 per cent. (for expenses of Kartel), or say $0.51 per 100 lbs. on the 1,000,000 lbs. consumed, but nothing on the 2,000,000 lbs. exported.

Suppose the average price for the month at Magdeburg is $2.04 or below, as at present, then the amount to be paid into Syndicate (2) by its members is the difference between $2.04 and $2.78 per 100 lbs., $0.74 per 100 lbs., plus 10 per cent., say total $0.81 per 100 lbs. on the 1,000,000 lbs. for consumption and nothing on the 2,000,000 lbs. for export.

Suppose the entire consumption for one year is one-third of the entire consumption and export combined, then the Kartel would receive into its treasury one-third of $0.81, or $0.27 per 100 lbs. on the entire amount of sugar sold by Germany during a crop year October 1st to September 30th.

Syndicate (2) pays over to Syndicate (1) the amount received into the Kartel, less 10 per cent., say $0.74 per 100 lbs. at different times, always keeping a large reserve on hand for contingencies. The first year it paid out 50 per cent. of its receipts, the second year 75 per cent. and the present year 100 per cent.

When Syndicate (1) receives the money it distributes it to its members in proportion to the amount of production allowed them by the tax authorities (the Government controlling the output of each factory).

Suppose further that the average price for one year is $2.04 per month or below (as now). In 1900-1901, 663,000 tons of refined sugar entered into consumption, the combination advantage or "Kartel" amounting to $.81c. per 100 lbs., is $12,118,600 or without the 10 per cent., $10,906,800.

The total consumption and export of sugar in Germany (1900-1) was 1,668,000 tons. This would amount to a compensation to the producers of raw sugar of $.26 per 100 lbs. on their entire production.

The average value in the Magdeburg market for the year being, say $1.635 per 100 lbs., this would give them $1.635, plus $.265, or $1.90 per 100 lbs. for all their raw sugar sold for consumption.

The present Magdeburg price of raw sugar is $1.635 per 100 lbs., plus $.745 Kartel, or $2.37 per 100 lbs. The export price of raw sugar at Hamburg is $1.47 per 100 lbs.

Thus, by receiving $2.37 per 100 lbs. for one-third of his production, he is able to sell two-thirds of his production for

export at $1.47 per 100 lbs. or an average price for all his production of $1.52, plus $.265, or $1.79 per 100 lbs. The export price being $.32 per 100 lbs. less than his average selling prices and $.90 per 100 lbs. less than his consumption selling price.

The Refiner Syndicate (2) is able to pay into the Kartel the $.815 per 100 lbs., because it pays $1.635 per 100 lbs. for raw sugar in Magdeburg market and $.815 into Kartel and $.875 per 100 lbs. for refining expenses and normal profits, and $2.18 per 100 lbs. consumption duty, a total cost of refined to him of $5.50 per 100 lbs., for which he gets now in the Magdeburg market $6.14 per 100 lbs., leaving him $.64 per 100 lbs. as his profits resulting from the Kartel, over and above his normal profits covered in expense of refining. The refiners obtain the Kartel benefit of $.64 per 100 lbs. on all refined sold for consumption which enables them to sell their surplus for export at $1.81 per 100 lbs. f. o. b. Hamburg.

If we add to $1.81 the export bounty of $.38 and the consumption duty of $2.18, we have the price at which the refined would sell for consumption on the export price basis, say $4.37 per 100 lbs., whereas the price for consumption is $6.14 per 100 lbs., an artificial increase from Kartel bounty of $1.77 per 100 lbs. The refiner pays $.815 of this into the Kartel and retains $.95 per 100 lbs. for himself.

Or to put it another way, when the refiner exports Granulated, he can deduct from the $5.50 per 100 lbs. cost (including normal profits) the export bounty $.38, plus the consumption duty $2.18 and the $.81 due the Kartel, say $3.38, leaving his cost $2.12 per 100 lbs. while selling at $1.81 per 100 lbs., an apparent loss of $.31 per 100 lbs., but while he loses $.31 per 100 lbs. on his exports of refined during the crop of 1900-1, say 550,000 tons, he makes $.64 per 100 lbs. on his consumption sales of 768,000 tons refined, leaving him a total net profit of $.245 per 100 lbs. on all his business.

Thus it appears that the raw sugar manufacturer makes by the Kartel, $.265 per 100 lbs. on all his production, and the refiner makes a profit of $.245 per 100 lbs. on all he refines, both of these Kartel profits being over and above the normal profits charged in the cost of manufacture.—Willett & Gray.

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SISAL HEMP IN QUEENSLAND.

It is as yet too soon to obtain a report of results from the Sisal hemp-growers who last year obtained parcels of plants from the Department of Agriculture, as it takes at least three years before the plants are old enough to yield the first crop of leaves. We have advocated the growing of this valuable fibre, for the reason that poor land not adapted for cereal or root crops can be utilized profitably at very small expense. Some have hesitated to plant, owing to the fear that expen-

sive machinery would be needed for preparing the fibre; others because such a large water supply is needed. In view of these objections, we place before our readers the statements of Mr. Quennel, in the Journal of the Jamaica Agricultural Society. That gentleman says:—

I have seen, with a deep regret, some persons rejecting at first the idea of cultivating fibre plants in Trinidad as requiring too much capital and too costly machinery.

This is a great mistake. Yucatan is their proof of it, because the Indians of that country export now more than 100,000 tons, prepared with a very rough machine called "raspador," a wheel of 4 feet diameter, working at 160 revolutions a minute. The cost of it cannot be, with horse gear, above $150. That machine is easy to move from one place to another. It wastes a certain amount of material, and is slow at work; but it is not the first time that the primitive appliance of the pasantry has succeeded better than costly machines and big capital, with their heavy interests and annuities. The raspador gives net 333 lbs. in ten hours. A machine for working three-quarters of a ton would cost, with a steam engine and the buildings to correspond, £1,200 at least, when five raspadores would not cost more than £150.

A steam engine would not be moveable and could not be economically established where the area under cultivation would be less than 1,000 acres.

I take my data from various reports from Dr. Morris, Imperial Commissioner of Agriculture, Barbados, and from Mr. Richard Dodge, of the Washington Fibre Investigation Committee on account of the Government of the United States.

From them I come to the conclusion that the fibre plant gives a hemp of the value of £30 a ton in London which I reduce to 14 a ton after allowing for discount, commission, and freight, and also for cultivation and packing. This is less than the amount given in the reports referred to.

I take for planting five rows in 36 feet—that is to say, four at 6 feet distance and the fifth at 12. I put the plant 6 feet apart in the rows. This gives me more than 1,000 plants to an acre. Each plant at four years gives forty leaves a year of a weight of 50 lbs., of which 4 per cent. turns into fibre, dried and white, or 2 lbs. of fibre to a plant, or 2,000 lbs. an acre. £14 a ton is more than 3 cents a lb. I allow only 2½ cents a lb. to make $50 an acre. Thus an acre producing net $50 yields double the results of 200 cacao trees on an acre, at 10 bags per 1,000 trees at $12 net (when 65s. the London market quotation) or 2 bags, $12 equal $24. It is a great deal more than 20 tons of sugar cane to an acre at 9s. a ton, leaving probably not more than 1s. a ton to the cane farmer, or £1 an acre.

If the acre gives 2,000 lbs. a year, and a raspador prepares some 330 lbs. a day—100,000 lbs. a year of 300 days—it will

require 50 acres to produce sufficient fibre for one raspador's work in one year; 5 raspadores for 250 acres; 20 for 1,000 acres.

But what strikes me more is that I noticed that on all the sugar plantations, all the cacao estates, everywhere on Crown lands, there is a large extent of useless land, when not first-class. Well, the fibre plants grow nearly everywhere except on absolutely barren lands; and immediately everyone can foresee what is the future of Trinidad when all lands, unless barren, will be cultivated with plants yielding double what cacao gives. One thousand acres of land for sugar cane, giving 1,500 tons of sugar, will require (if I do not make a mistake) £37,000 worth of machinery, at least; and 1,000 acres of land for fibre plants will require only twenty raspadores costing £600, and will give yearly at fifty dollars, or £10 per acre, £10,000 sterling to repay cost of land and of contracts.

But no industry can be established with safety if it is not started with economy and perseverance, or if anyone is discouraged because purchasers do not come from abroad to buy the first lb. before it is ready. I believe that this, and five or six years' gambling in the London Exchange, have stopped the first attempt made in Tobago and in Bahamas some ten years ago. But the machines have been greatly improved during the last four years; the prices, after fluctuating during the time of speculation between £13 and £75, have become steady at £30, and the plants, ten years old now, are everywhere giving sprouts from their roots and seeds from their poles.

The Agricultural Society is being called upon to decide regarding the introduction of hard-working immigrants from Teneriffe. Can we find a better basis for settlement by free companies of these free people, in a free country? Profitable contracts could be offered to them on landing at the Quay, at a rate of $25 an acre—$5 after brushing, $5 after planting, and $15 on delivery on forth year. Each contractor would not receive more than 12 acres to be planted in three years—4 acres a year. As there is very little trouble in cultivating the fibre plant when it is a year and a half old, every year each contractor could receive some 4 acres more. In five years he would have planted 20 acres, and from the fourth to the ninth year he would receive $500, whereas 12 acres in cacao, or 2,400 trees, would give him only $480 in the same time. [$1=4s. 2. 2 cents=1d.]—Queensland Ag. Jour.

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The United States continues to stand at the head of the list of the world's exporting nations. For the nine months ending with September our exports of domestic products were $1,024,605,181, against $1,018,845,768 for Great Britain.

A NATURAL ENEMY OF THE SUGAR CANE BEETLE IN QUEENSLAND.

Walter W. Froggatt, F.L.S., Government Entomologist.

In the cane fields of Queensland for some years the planters have suffered considerable loss from the ravages of several species of lamellicorn beetles, the grubs of which, in their natural state, feed upon the roots of the native grass and plants. When the indigenous vegetation was destroyed in the course of cleaning and cultivating the land, these grubs had to find fresh food supplies, and soon discovered that the roots of the sugar cane made a very good substitute.

There are quite a number of beetle larvae recorded, doing more or less damage to the cane, of which the first figured in the plate is the chief pest.

I am now very pleased to be able to report that, from the observations of Mr. J. C. Clarke, of the Humbledon Sugar Mill, Cairns (whose letters are appended by the courtesy of the general manager of the Colonial Sugar Company), a friendly insect has been found which destroys a considerable number of these beetle grubs, and which also appear to be increasing in numbers in this district. Through the collection of specimens of the pests and their destroyers collected by Mr. Clarke, the writer is enabled to give an account of the life-history of the insects, and a general account of the habits of the wasp.

This parasitic wasp (*Scolia formosa*) belongs to a group of the great order *Hymenoptera* (containing the bees, ants, and wasps), and comes in the family *Scilidae*, large, powerful wasps, either black or black and yellow, more or less banded with yellow bars or blotches, often thickly covered with hairs, and provided with powerful digging legs adapted to their burrowing habits.

The adult wasps frequent flowers, feeding upon the honey, and several species are not uncommon in our gardens toward the end of summer. They are easily captured with a net or killing bottle when feeding, but should be handled with care, as the female is armed with a powerful sting.

The female wasp, when ready to lay her eggs, hunts over the ground until she detects some grub underneath; then she burrows down through the soil to the grub she is in search of, which is immediately stung and thus reduced to insensibility, but not killed. This single egg is deposited upon the under surface of the beetle-grub, below the thoracic segments, the mother wasp working her way out again but never placing more than one egg upon a grub. As soon as the baby wasp is hatched, it forces its head through the skin of the grub and sucks up its juice, feeding upon the helpless grub, but not killing it. As the wasp increases in size the beetle-grub

wastes away until nothing is left but the skin, and by this time the larval wasp is full grown and ready to spin a stout oval silken cocoon in which to pupate, the perfect wasp emerging in the following summer.

There are thirty species of *Scolides* described from Australia, and, as several species are somewhat plentiful, they must destroy an immense number of beetle-larvae that feed upon the roots of grass and herbage.

THE YELLOW-BANDED SCOLIA (DIELIS FORMOSA, GUERIN).—The wasp measures about an inch in length; the general color of head, thorax, and abdomen, black; antennate and apical portion of legs, brown to reddish-brown; the segments of the upper surface , barred with yellow, which band, being thickly clothed with stout yellow hairs, gives it a much brighter tint; the second and third segments are also ornamented with a pair of rounded yellow blotches. The wings, semi-opaque, shining reddish-brown. The whole insect thickly clothed with stout hairs, those upon the upper surface bright yellow, but upon the legs and under surface fading from dull yellow to grey; so that though in reality black for some time after it emerges, and before the hairs get rubbed off on the head and thorax, it looks more yellow than black.

The larva when full grown measures about 1½ inches in length, and is of a uniform white color, smooth, and hairless. The head and thoracic segments are elongated, bent sharply upward from the abdominal portion, and tapering to the mouth at the tip; the segmental divisions are well defined, those of the head and thorax cylindrical, with the abdominal ones more obese and broadly rounded at the apical segment. The pupal case is elongate, oval in form, slightly over an inch in length, and 5 lines in diameter in the center. It is composed of dark reddish-brown silk, forming a thick inner cocoon and a more loosely enveloping thin outer skin; the full grown insect emerges by cutting out a lid at the apex.

THE GREY CANE BEETLE (LEPIDODERMA ALBO-HIRTUM, C. O. WATERHOUSE).—This destructive cane beetle was described by Waterhouse in the Transactions of the Entomological Society in 1875 from Northern Queensland, where it has since increased in such numbers in the cane fields as to do serious damage to the crop. It is a stout, thick-set beetle, slightly over 1¼ inches in length, and in general form somewhat like the typical cockchafer. The general color is reddish-brown, but it is so thickly coated with grey scales that it has a uniform grey tint on the upper surface; the head, legs, and tip of abdomen are also covered with stout, reddish hairs. These beetles lay their eggs among the soil or decaying vegetable matter, the young larvae making their way down to the roots of the cane plants, upon which they feed. When full grown they change into a dark yellowish-brown pupa, not enclosed in any cocoon, but in an oval cavity made by them when un-

dergoing the transformation from grub to pupa. The beetles emerge from the ground early in the summer, and are found clinging to the foliage in the daytime. The larva measures 2½ inches in length; general color white, rounded and corrugated on the dorsal surface, with the under surface more flattened; the head is reddish-brown, smooth and shining, labrum somewhat roughened; jaws black, chisel edged; antennae long, four-jointed, without counting the basal tubercle; the third one broad, projecting at the apex on one side past the base of the shorter fourth joint. The first and second pair of legs stout, clothed with short reddish hairs and terminating at the extremity with fine tarsal spine or claw. The whole of the under surface of the head and thorax clothed with similar coarse hairs, which are more sparingly scattered over the basal half of the abdomen, and are replaced with shorter spiny hairs, slightly hooked at the tips, clothing the anal segment. The upper surface of the larva on the basal abdominal segments is clothed with fine, short, reddish spines; the spiracle circular, reddish-brown, with the center yellow, with a ferruginous plate upon either side of the first thoracic segment.

The Queensland Elephant Beetle (Xylotrupes Australicus, Thomp).—Was described by Thomson as far back as 1859. This well known insect is one of our largest lamellicorn beetles and needs no description, as the illustration (life size) gives all its details. It is found in the northern portions of this State, and is also very plentiful in many parts of North Queensland, where the larva is said to sometimes attack the sugar cane in a similar manner to that of the previous species. but is not so injurious or plentiful as the smaller one. They also lay their eggs in decaying vegetable matter, and I have had numbers sent me from the Lower Burdekin, bred in the megass about the sugar mill. At a plantation near Cairns, the writer remembers seeing a jacandra tree near the house so thickly covered with these large beetles that the trunk and branches were quite black, and when the lamps were lighted and these great fellows came flying into the room, flopping down upon one's book, they were enough to startle a stranger unused to the ways of North Queensland insects.

The extraordinary development of the head and front of the thorax, is peculiar to the male beetles, the female beetles being smaller, with the ordinary rounded thorax and small head. It is only ornamental and is not used for nipping one, as many people would suppose from its peculiar shape; and if the beetle be examined, its mouth will be observed close below the eyes, and small in proportion to the size of the beetle.

The larva of this beetle is an immense white grub, whose habits and development is similar to that of the Grey Cane Beetle.

Larva measures 4 inches in length, very broad, flattened on the under surface, and tapering slightly to the extremity. The body of the usual dull white tint, with the head dark reddish-brown; jaws black; antennae composed of four irregular joints, the third with a somewhat similar flange or finger upon the extremity as on the cane beetle. The legs stout; labrum, legs, and under surface of larva thickly clothed with short, reddish spines, and a fringe of longer hairs down the sides and anal tip.

Mr. Clarke writes: "The large grub in No. 5 bottle is the larva of the Elephant Beetle. This specimen, along with three others, was found in the headland of a cane field, not far from a stool of cane. It is doubtful if they interfere much with the cane roots. They are most frequently found when breaking up headlands and near old tree stumps in and about the cane fields; they are also very numerous round about the fuel stacks, which points to the conclusion that they live chiefly on rotting timber and dead and decaying vegetable matter."

Mr. James Clarke's notes upon the wasp parasite, furnished to the General Manager of the Colonial Sugar Refining Company.—"You will be pleased to learn that I have just unearthed the predaceous larva of an insect that preys on our notorious cane grub. You will see by the specimen I am forwarding by this mail that it is a legless, white, fleshy grub, with a soft pointer retractile head. When at work it burrows its head into the lower part of the thorax, near the abdomen, and sucks the vitals out of the cane grub, leaving nothing but an empty skin. I dug up several specimens of cane grubs in the nursery here with the parasites attached to them in the manner described, and also found numerous empty cane-grub skins lying near by. This cane-grub destroying larva does not seem to feed on vegetable matter, as there is no discoloration of the hind-most segments of the body, as indicated in grubs that live on underground vegetable and earthly material. Of course this is only conjecture, as grubs work underground during the destructive stage of their lives, and are hidden, and their habits at the time are difficult to distinguish. Nature is always at hand to help the observant cultivator. Some of the worst crop-destroying insects are in their turn destroyed by other insects, and these latter should be fostered and encouraged. It is for us to ascertain the habits and life-history of this carnivorous larva, and no time should be lost in sending out a full description of its physical appearance, so that it may not be destroyed by 'boys' following the plows and killing grubs indiscriminately."

Appendix.—"I have been struck with a paragraph in 'Sugar: A Hand-book for Planters and Refiners,' pp. 19-100, regarding the destruction of insect pests of the sugar cane as

follows: 'Turkeys, and the smaller insectivorous birds, devour enormous numbers of the grubs. Success has attended cultivating other natural enemies of these noxious insects to be found in the ichneumon-flies, &c. The plan is to plant a hedge of the Congo or pigeon pea (*Cajanus indicus*) around each field, and to grow the Bona Vista bean (*Dolichos Lablab*) and the pigeon-pea on all fallow fields, plowing in the latter as a green soil manure. These plants attract the ichneumon-flies in such numbers that the whole estate may be completely freed from the destructive vermin.' Now, it is a remarkable fact that although very large quantities of collected cane grubs passed directly through my hands whilst I was cultivation overseer at the Victoria Mill, I never before saw them attacked and destroyed as they are in our small nursery here. In this nursery we have had growing, during the last eighteen months, *Dolichos Lablab,* pigeon-pea, lupins, vetches, and numerous other green manure crops—some of which were imported beyond the State,—and it is just possible that this insect, the larva of which is so destructive to the cane grub, pearance; in fact, so much so that until quite recently I took them all to be one and the same kind in different stages of growth. You will see by the specimens of pupae that I am sending you that this is not the case, for although they resemble each other in the larval state there is a marked difmay have been attracted or introduced into the nursery through the medium of one or other of these trial green crops. I may here add that I had just cropped the canes forming a series of small experiments close by in the same nursery, some of which gave indications of grubs being at work on their roots. I, therefore, thought it would be advisable to examine the different species and count the number of grubs in each plot before reporting on the yields and qaulity of the cane raised thereon. This circumstance led to the discovery of the larvae feeding on the cane grub as already described."

LETTER.—13TH SEPTEMBER, 1901.—"You will be pleased to learn that I have acquired further knowledge of the habits and life-history of the cane grub parasite that I wrote to you about last week. In the first place, I would like to say that there are two kinds of cane grubs here that feed on the roots of the sugar cane. There is the large-sized common cane grub that we are all so well acquainted with, and there is a smaller species, equally as numerous—less than half the size of the common sort, but very much like it in outward physical apference in the next stage of their development. The pupa of the larger or cane grub* will, as you already know, ultimately metamorphose into a beetle. You will find specimens of this grub in No. 1 tin. The life-history of this insect is well known, and its cycle of existence is as follows: January to February, egg; from thence to August, grub; August to November, pupa;

*Lepidoderma albo-hirtum.

and beetle from November to January. The other smaller cane grub, specimens of the pupae of which you will find in No. 2 tin, also enters into the semi-torpid stage of its existence during August and September, but how long it remains in the chrysalis—or what it is like when it emerges therefrom —I am unable to tell. I am at present breeding some, and hope to know more of its history later on.

"The parasite that I am sending you photograph and specimens of seems to make very rapid growth after it has once started to suck the life out of the cane grub. When it has attained full growth it drops off its prey and immediately begins to make a smooth oval cavity in the soil, the walls of which it lines with a brown silky cocoon. One larva I have under observation at home during the past week took four whole days to complete its encasement. I am sending you half a dozen chrysalids of this valuable parasite. These might be given to an expert entomologist to breed from and report on. The cocoon shown in photograph was afterwards opened by Dr. Reed in my presence, and in it we were fortunate enough to find the 'imago,' or perfectly matured insect—as shown in photograph. On emerging from its chrysalis case it was quite lively and active, and did not seem to suffer in any way from its sudden and premature release. The specimen I have sent you in No. 4 bottle is the same insect taken from the cocoon. As anticipated, it has turned out to be a large wasp of the order *Hymenoptera*. The female wasp evidently pierces the skin on the stomach (if we may so call it) of the cane grub with its ovipositor and deposits an egg which, when hatched, produces larvae that immediately commences to devour the internals of its host. I have found the parasitical larva at all stages of growth on the stomach of fully matured cane grubs,—from the size of a grain of rice up to the time it drops from its prey, when fully an inch long,—but I never saw more than one parasite on one cane grub. I am also glad to be able to say that I have found our parasitical friend attached to the smaller cane grubs also, but not so frequently as on the larger and more common kind.

"Numbers of these large wasps or hornet-like flies, whose larvae we know prey on the cane grub, have been observed for some time back buzzing amongst the yellow blossoms of the pigeon pea, which seems to specially attract them in our small nursery here; but, up to a few days ago, I never imagined they had any connection with the legless larvae that are doing such good service for us underground."

Conclusion.—I have given Mr. Clarke's observations as they were written, as they show such capital field work and careful investigation of the insects he was observing.

The fact of pigeon-peas and other plants being in the plant nursery may have attracted the *Scolias* into the places. As before noticed, the adult insects are attracted by sweet-smell-

ing flowers. The second cane grub mentioned by him has not yet been bred out, but it appears to be one of the rose chafers from the large rounded earthen cocoon it forms in the pupal state.—N. S. Wales Ag. Gazette.

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FINANCES IN JAPAN.

The Japan Gaette republishes from the Kobe Chronicle the following address on Japanese financial conditions, delivered by Mr. Yamamoto, president of the Bank of Japan, before the Osaka Bankers' Club:

The financial crisis which prevailed from last year to April or May of this year is still very fresh in our memories. Happily, the difficulties have been overcome without very disastrous results, on which fact we are to be much congratulated. It is well known that the crisis originated in the boom which came after the war with China. The capital of various business companies (banks excepted) invested in machinery and other immovables stood at the enormous sum of from 60,000,000 yen ($29,880,000) to 90,000,000 yen ($44,820,000) in the years 1896-97. The Government drew up a financial scheme for the next ten years, which suddenly expanded the annual national expenditure by a large amount. The money required was to be drawn chiefly from the increase of taxation, the issue of bonds, and the indemnity received from China; while the fund for the extension of telephone and telegraph systems, the railway, and the establishment of the iron foundry was to be raised chiefly by issuing domestic bonds. For this purpose, it was proposed to raise the sum of 270,000,000 yen ($134,460,000). This proposal in itself seriously affected business. Such a radical expansion of the country's finances soon brought about a reaction, and the aim of the Government—which was practically to distribute the indemnity money received from China among the people, thus giving them wider scope in their business and at the same time enabling them to subscribe to the bonds—was defeated. The money spent by the Government on public works chiefly found its way into the pockets of the laboring classes, not to return easily to the Government. The prices of articles rose, the imports exceeded the exports, and business circles were placed in a most trying position. The people began to complain of the Government scheme, all hope of the proposed domestic loan being raised was abandoned, and the Government was finally compelled to modify its financial proposals. Taxation had to be increased again and again, and arrangements made to raise a foreign loan instead of the domestic loan before proposed.

Laws were amended to meet the change in the scheme, and bonds to the amount of 42,000,000 yen ($20,916,000) were placed on the foreign markets, and some 100,000,000 yen ($49,800,000) was also raised from abroad, by means of which the Gov-

ernment managed to carry out its scheme to the present year. Yet scarcity of money in business circles increased day after day, with the result that there was a contraction in business enterprise. The total amount of the paid-up capital of commercial companies, which stood at some 90,000,000 yen ($44,820,000) some years ago, fell to about 21,000,000 yen ($10,458,000) last year and to 19,000,000 yen ($9,462,000) this year. This, however, meant that the demand for money had returned to its normal level.

Order having now been restored in the finances of the country, in my opinion it has become necessary to cut down the public works within the limits of the country's financial ability. Last year, I urged the Government authorities to follow this policy. The last Cabinet fell on account of financial troubles, and the present Cabinet, finding a deficit of 50,000,000 yen ($24,900,000) in the revenue, entered into negotiations for a foreign loan. Happily or unhappily, the negotiations failed, and I do not think we need be disappointed that they did fail. Indeed, the failure of the negotiations will be productive of good in Japan. It has led the Government to make up its mind to postpone or suspend a part of the projected Government works and to readjust or economize expenditure. The only course now left for the Government to take for raising the necessary funds is to count on the Bank of Japan, no loan being otherwise possible at home or abroad. It is impossible for the Bank of Japan to make limitless advances even to the Government. When the negotiations for the foreign loan failed, the bank made inquiries of the Government as to the repayment of the advances now standing, and was assured that of the amount of the loans made by the bank, which will equal some 40,000,000 yen ($19,920,000) at the end of the present year, 20,000,000 yen ($9,960,000) would be repaid about February next, by disposing of the bonds now kept at London by the Government and of the silver seized in China. The whole amount it is proposed shall be repaid in July next, when the half-yearly balance is made. With this assurance the bank has agreed to make further advances, and the issue of the notes of the bank beyond the legal limit will probably amount to some 30,000,000 yen ($14,940,000).

There being good prospects of the money so advanced being easily recovered, the financial position will not be much affected.

The financial prospects are very promising. In particular, the rice crop has proved to be exceptionally successful, and the export trade has much improved, the raw-silk market being particularly active. There is, therefore, every hope of improvement of trade in the future.

JAMAICA BANANA TRADE.

The direct transport of bananas in bulk from Jamaica to the United Kingdom was inaugurated in March, 1901, when the first steamer of the Imperial Direct Service left Kingston for Avonmouth with a full cargo of fruit. The bananas reached England in excellent condition so far as the effect of transit was concerned.

STORAGE CONDITIONS.—The appliances for ventilating the holds in which the bananas were stowed and for maintaining a uniform temperature were found to work admirably, and when the fruit was unloaded it had undergone little or no deterioration in transit. The steamers of the new line have since made regular voyages at intervals of a fortnight, and I understand that the satisfactory experience of the first voyage of the Port Morant has been repeated and even bettered. I returned from Jamaica in the Port Morant on her second homeward voyage. In the course of the passage I visited the fruit chambers more than once, and inspected the more accessible of the many thousand bunches of bananas stowed therein. So far as my observation went they were all in good condition, ripening slowly and uniformly, but showing no signs of over-ripening, none of serious damage, and none whatever of decay. A few of the fingers—a single fruit is called a finger—had been slightly bruised in handling, the rind being partly discolored, but this is rather a blemish than an injury, and is often seen on the fruit brought to table even in Jamaica.

ABSENCE OF ODOR IN TRANSIT.—I have heard it said in some quarters that bananas are a very unpleasant fruit to carry in passenger steamers, that the odor they emit in the process of ripening is strong, persistent and unsavory, and that it pervades the ship to the great annoyance of her passengers. I can only say that the atmosphere of the fruit chambers in the Port Morant was as sweet and fresh as it was on deck, and in tropical latitudes a great deal cooler. I doubt if the nose of any passenger could have told him that there was a single banana on board, though he might have been aware that the sugar planters of Jamaica had availed themselves of the direct service to ship rum in considerable quantities to England. I have travelled in a mail steamer with apples from Tasmania and with cocoa from the West Indies. I would gladly have exchanged the companionship of either for that of bananas from Jamaica. *De non apparentibus et non existentibus eadem est ratio.* The odor of apples and the odor of cocoa were obtrusively and persistently apparent throughout the voyage. The odor of bananas was, to my nostrils at any rate, entirely non-existent.

CONDITION ON ARRIVAL.—Thus the mere problem of transport, and of inoffensive transport, in a first-class passenger steamer, across 4,000 odd miles of sea, was practically solved

from the outset, and further experience has, I understand, since bettered the solution. I am not here concerned with the problem of distribution and sale in England, about which there is more to be said than I am competent to say. But there is one point connected with the market for Jamaica bananas in this country about which some misapprehension has arisen which it is worth while to dispel. It is no use bringing bananas from Jamaica to England unless when they arrive they are acceptable to the consumer and readily saleable at a price which yields a fair profit to the importer. There is a problem here which was certain to prove more difficult of solution than that of transport pure and simple. It is not insoluble, for it has been solved, in spite of similar difficulties, in the case of bananas from the Canaries; but it was not, perhaps, completely solved in the case of the first cargoes of bananas from Jamaica. The fruit as placed upon the market was pronounced in some quarters to be insipid and immature. I daresay it was—indeed, it could hardly be otherwise when an entirely new experiment had to be tried. No one could tell, until experience had yielded up the secret, at what precise stage of maturity the banana should be cut from the plant in order that it might be just ripe and ready for market—neither immature nor over-ripe—after a transit of some 14 days. It was necessary in the first instance to ascertain that a transit of 14 days would neither arrest the ripening of the fruit nor consign it to premature decay. This was placed beyond a doubt by the first few voyages, but it still remained to ascertain the precise stage of maturity at which the fruit should be cut in order that it might be just ready for sale and consumption at the time of its arrival. I do not think this problem was completely solved in the first few cargoes, and this goes far to explain the insipidity and immaturity of which some critics complained.

When to Cut Bananas.—The banana is peculiar in this respect that even where it grows it is never allowed to ripen on the plant. The several "hands" of which the bunch is composed ripen not simultaneously, but successively, and, as the process of ripening advances, the upper hands are much nearer to maturity than the lower hands on the same bunch. But, if the bunch be cut at the right moment—the choice of which is one of the most critical operations of banana-growing—the stalk retains sufficient sustenance and vitality to carry on the process of ripening to its maturity. The bunch is accordingly cut while the fingers are still green, the state of maturity at which it is cut being determined by the time at which the fruit is required for consumption. Thus bananas which are to be consumed on the spot are allowed to ripen much more fully on the plant than those which are to be consumed in the United States, and these again are more fully ripened than those which are to be consumed in England.

But in all cases the final ripening takes place after the bunch is severed from the plant. Unlike the orange, the banana is, for this reason, just as good when eaten in good condition thousands of miles from the place where it grew as it is when eaten on the spot. In Jamaica it may take a day to ripen, in the United States it has required at least a week, in England at least a fortnight, but that is all. A ripe banana in England is just as good as a ripe banana in Jamaica, and both are ripened off the plant.

Modes of Packing.—This being so, the first problem to be solved was, as I have said, whether the ripening process could be prolonged for a fortnight or more. The United Fruit Company had long shown that it could be prolonged for a week or more, and had also ascertained that for a period of that duration the bunches could be shipped without packing and preserved in good condition without special appliances for refrigeration. So far bananas imported into England from the Canaries have been wrapped in cotton wool and packed in crates, each bunch in a separate crate. This is because the conditions of transport and delivery on board are not favorable in the Canaries to the handling of the fruit without injury, though, where the conditions are more favorable, as they are in Jamaica, it is found that the bunches can be safely stowed and carried on board without packing of any kind. They are simply placed one above another and one against another in large receptacles in the fruit chamber. Their preservation in these conditions is a matter of ventilation and regulation of the temperature. The United Fruit Company, having a shorter transit, do not employ special appliances for this purpose, but in the steamers of the Direct Service the appliances for ventilation and the regulation of temperature are very complete, and apparently, entirely successful in the result. It is now certain that the banana can be brought in good condition from Jamaica to England, and that the ripening process and be safely prolonged over the 14 days or more occupied in transit from field to market without injury to the fruit. This at least may be taken as proved by the first experiences of the Direct Service. It remained for further experiences to show that the fruit could be cut at the right moment in Jamaica and sold at the right moment in England. It was quite in accord with the precedents of the Canary banana trade that this problem should present some difficulties. It was not less in accord with the same precedents that the difficulties should be surmounted in time. I think it may be taken for granted that the complete solution of the problem is now assured, if not already accomplished. The promoters of the Direct Service are not the men to enlarge their undertaking on a precarious or merely speculative basis. They are now taking preliminary measures for the establishment at no distant date of a weekly, instead of a fortnightly, service.

DEMAND FOR BANANAS.—But will the demand be equal to it? That remains to be seen. I can only point to the amazing growth of the Canary banana trade in England and of the Jamaica banana trade in the United States, associated, as the latter is under the United Fruit Company, with a still larger growth in Costa Rica and a growing cultivation in Cuba and Puerto Rico. This latter is an element by no means to be overlooked. The time may come when the United States will no longer look to Jamaica for bananas, and, looking to Cuba and Puerto Rico, may even exclude the Jamaica fruit, in the interest of planters in the American Antilles. That time is not perhaps at hand, but if ever it comes it will bring disaster to Jamaica, unless in the meanwhile she has provided herself with another string to her bow. The string is now twisted and fitted—for, in spite of Froude, the sons of England are still willing to try and bend the bow of Ulysses on occasion—but it is rather a puny string at present. The contract for the Direct Service only provides for a fortnightly steamer carrying 20,000 bunches of bananas. This amounts only to half a million bunches annually, a mere drop in the ocean compared with what Jamaica can supply in the future, and does supply at present to the United Fruit Company. But the contract does not exhaust the possibilities of the trade, and the service is already destined to become a weekly one. That will account for a million bunches a year, but even that is no very large demand as judged by the consumption of the United States, and no very large supply as judged by the capacity of Jamaica to produce. At the height of the banana season—that is, at the time of the year when fresh fruit is not otherwise to be had in the United States—from 18 to 20 steamers a week laden chiefly with bananas leave Jamaica for some port or other of the United States. It seems visionary to conjecture that the fruit trade with the United Kingdom will ever approach to anything like the same dimensions, but more unlikely things have happened, and a generation ago any one who predicted the growth of the Canary banana trade to its present proportions would have been regarded as equally visionary. Its founder was long thought a fool for his pains. He is also the founder of the Jamaica banana trade.

BANANA CULTIVATION.—Moreover, though the banana is and must always be the mainstay of the Jamaica fruit trade, there are many other fruits which can be cultivated to a profit for export. Some high authorities think that the cocoa-nut is quite as profitable a cultivation as the banana, though, as it only comes into bearing after about seven years, the returns are not so rapid. On the other hand, it remains in bearing for a hundred years or more and requires little or no attention. The banana will only grow to perfection on the same soil for about five years consecutively. The stem dies down annually after producing its fruit, but the root is perennial and pro-

duces suckers, one of which is allowed to take the place of its predecessor on the same spot. At the end of five years the land requires deep plowing to work in the decaying matter left by the previous crops, and new stocks are planted, often on fresh ground. But an abandoned banana plantation need not be left fallow. During its occupation by the banana the luxuriant growth of the latter affords the required shade for other and more permanent forms of cultivation, such as cacao, coffee, nutmegs, limes, oranges, and cocoa-nuts, so that when the time comes for giving the land a rest from the banana it is stocked with permanent fruit trees, just coming into bearing. Many of these cultivations are less profitable than that of the banana, but they are more permanent and much less precarious.

Risks of Banana Cultivation.—Banana-growing is undoubtedly a very risky business. Its profits are great when realized, but a violent north wind may destroy the whole growth of a year in a single night. There is no guarding against these "blows," as they are called, and no anticipating them. The planter must take his chance. The wind bloweth where and when it listeth, and it may ruin one planter's crop and leave that of another unscathed. It would naturally seem that this is a case for insurance, but I am told the risk is too great. I should rather conjecture that the enterprise and capital of Jamaica are too timid. It hardly seems likely that the United Fruit Company could thrive so well as it does on a business of which the risks are so great as to be incapable of insurance. The company grows a considerable proportion of its own bananas, and presumably finds it profitable to do so, underwriting its own risks. It does not seem clear why other planters should not seek to cover their risks by suitable methods of insurance. But apparently they do not.

While the New York banana importers have supplied the market with nearly a steamer a day, it was with difficulty the jobber could supply the demand for ripe fruit to fill Easter orders. The usual spring advance in prices of all grades of bananas has already made itself manifest, and these conditions are likely to remain for the next few months, owing to the scarcity of small fruits and the popularity of the banana as a spring diet. Many grocers and small dealers are finding it to their interest to order bananas shipped to them cut in hands, the average-sized barrel holding two large bunches, or about twenty-five hands when cut up and packed in layers. One advantage realized by the inland dealer in this mode of shipping bananas is the increased sale of the fruit by the hand. Instead of disfiguring a handsome bunch when hung up, by cutting out a few of the choicest bananas from various parts of the bunch to satisfy some fastidious customer, leaving the bunch in a very uninviting condition, the dealer can now have these bunches cut in hands, which can be nicely ar-

ranged in a basket on the counter and sold by the hand containing from one dozen to twenty bananas.

It is a difficult thing to give satisfactory quotations on bananas by the bunch, owing to the difference in quality and general appearance of the bunch. For instance, two large bunches of bananas of equal count might differ in price $1.00 a bunch, as one might contain large, clean, fat fruit that would find ready sale at $2.50; while the other bunch of equal count, but of small, thin fruit, could be easily purchased for $1.50. So the inland merchant when ordering bananas would do well to specify the quality of fruit his trade requires, whether large, fat fruit, or bunches of thinner fruit and greater count.—Ex.

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PREVENTION OF BUSH FIRES.

Chas. Robinson, in N. S. Wales Ag. Gazette.

The reports of bush and grass fires which have been published in the Press during the last month, and which recur almost every summer, have excited much sympathy with those who have suffered from the widespread ruin, and perhaps a feeling of anxiety and dread on the part of isolated communities which have so far escaped.

The pages of the Agricultural Gazette have done much to disseminate information about the valuable fodder grass Paspalum dilatatum, but I have not noticed that its probable value as a fire-break has been referred to. I have planted out about 20 acres of rooted offsets in dry, hot, and almost barren sandy soil; and while nearly every other description of grass has perished under the almost droughty conditions which this year prevail on the coast, the paspalum is green and growing. I have also made small plantations of offsets on clay soil, and while the land has opened with heat cracks on the surface, and ordinary grass, such as couch, has perished, the paspalum is green and vigorous, and if there were anything like a sward of it it would, I believe, prove a perfect fire-break.

If I am correctly informed, the more provident farmers seek to protect their cultivated crops by plowing strips of land along the outer boundaries, and leaving them unseeded. I suggest that if this precaution were further supplemented by the planting of rooted offsets of paspalum a yard apart—which could be done for a shilling a mile or less—and if the plowed land were kept cultivated until the time the paspalum seeded they would get a belt of dense green grass 6 feet wide as the result of the year's work, and this if continued for a few seasons would give them protection against fire from without and an extremely valuable pasturage for their stock. To plant much country by hand would be expensive, and unreflecting colonists who are accustomed to expect nature to do every-

thing for them without any effort on their part will I expect treat my suggestion as being as ridiculous as Mrs. Partington's attempt to mop up the ocean. Of this I am certain, cows, horses, and sheep eat paspalum so greedily that any man who attempts to pasture them upon it before the seed is ripe, will never increase the area of this grass from seed. If a small area of paspalum were fenced off until in seed, and sheep then put upon it for an hour a day, their droppings might be made to spread the seed over a wider area, and in that way probably much could be done. Similarly, a dairy farmer could resort to expedients by which the manure from his cows could be made the means of improving the value of his pasture land far beyond the fertility inherent in the stuff itself. Last year I placed a heifer about eight months old in a 4-acre paddock in which I had roots of paspalum growing at intervals of 6 feet apart, the rest of the surface having been seeded with cocksfoot, rye, clovers, and fescues. The calf fed almost entirely upon the pespalum, and while the plants have stooled freely there is not a seed stalk of paspalum to be found in the paddock. On the other side of the fence is another 4-acre paddock, precisely similar in every respect, except that it has been shut up from stock, which is full of stalks of paspalum in seed, and all that is wanted is three weeks of hot wet weather to germinate the seed which falls, and I am satisfied that I shall then have a paddock of thickly-covered paspalum far sooner than I could get grass in any other way. When I had less knowledge of the grass I planted a small paddock with paspalum roots, and had the mortification of finding, a few weeks afterwards, that a cow which had been left in the paddock had discriminated in favor of the paspalum, and pulled up and eaten nearly every root of it. The smaller rainfall in the country would make the spread of paspalum less rapid than on the coast; but, I believe, that if it were once established on the deep alluvial soils of Riverina, and, in fact, generally west of the Dividing Range, its marvellous power of deep-rooting would do much to shear an ordinary drought of its terrors. I believe that its roots have been found at a depth of 5 feet; but it is probable that in alluvial soil, having underlying moisture, it would be found to root almost any depth, and in this respect would resemble lucerne. While in dry shallow sand my seed stalks average 2 feet 6 inches high, in moist places, although the soil is such as would be reckoned by an ordinary grower of no value, I have clumps of paspalum which send up seed stalks 5 feet high year after year. Good soil on river flats would yield an amount of this valuable herbage greater than could be obtained from any other grass. In districts where there are seed-eating birds, the spread of the grass would be helped in that way.

For two or three years I almost failed to get any plants from the seed which I bought; but since I have saved my own

seed I find it can be grown as easily and as certainly as cabbage, turnip, or other garden seed. A dairyman or pastoralist who would grow a few yards of seed and treat it with the same care as he would garden seeds, keeping the ground moist for about three weeks, and keeping the land loose on each side of his line of seed, would soon have an enormous crop of seedling plants; while the original roots, from whose seed this frest of plants would spring, could, say after eighteen months, be broken up into cuttings, each having its own roots to start it, which would enable him to plant a very large area. The first plant I divided yielded me 215 such cuttings, and others exceeded that number.

The Railway Commissioners go to great expense in burning off the dry grass within their fences, and are, no doubt, harassed by enterprising lawyers wherever it can be suggested that a fire has spread from the sparks of their locomotives. They cannot, of course, be expected to carry on agricultural experiments, and yet I cannot help thinking that a ten-pound note spent in planting the grass, say, in three or four agricultural neighborhoods, might yield results which would save a large annual expense in labor by producing a permanent fire break. If the paspalum were established within their fences it would bind the soil of banks and other places more effectively than any other grass, while any stray seed which might germinate on the permanent way would be more quickly mattocked out than such grasses as couch or buffalo, or even than the ordinary staloniferous grasses. The best, indeed the only, time for planting paspalum is when there is a plentiful supply of moisture in the soil (I decidedly prefer early autumn). If the seasons should be favorable the success might be phenomenal; but, on the other hand, it might take many years to establish a dense sward of paspalum, more particularly as much of the seed would probably be burnt off by the Commissioners from year to year as a part of their usual precautions. It would be a work worthy of a patriot to plant a line of paspalum inside the railway fences wherever they extend throughout the State. The railway fences have been great conservators of valuable native grasses; and, in the case of a grass which seeds so freely as paspalum, the enclosures might also be expected to be great distributors of seed. I fear we cannot hope for an object lesson so important, beneficent, and far reaching in its consequences as that; but I do think we might expect that the Government should at, say, Wagga, Richmond, Bathurst, Gosford, and, in fact wherever they have a State farm or nursery, plant a five or ten acre paddock of paspalum, so that the rural population might see its value and be stimulated by self-interest to improve the pasturage which is at the foundation of nearly all our national prosperity.

A correspondent of the Melbourne Leader, who claims a long experience with grasses of various kinds in hot and dry

districts, states that he has tried paspalum in ground as hard and dry as a brick, and finds it, in midsummer, as "green as a leek." He recommends the extensive planting of it on stations.

I suppose it is not more than thirty years since Sida retusa was introduced to Queensland, in the expectation that it would be the foundation of a great national fibre industry; now I hardly know a nook or corner of the coast districts of New South Wales which is not infested with this useless woody weed, best known, perhaps, as Paddy's lucerne. Thistles, briars, and prickly pears are familiar instances of the rapid spread, under the silent and unnoticed conditions of nature, of noxious weeds; and there are other pests, said to be even more disastrous in the destruction of pasture land, which are coming across with almost railway speed from South Australia. People who regard with indifference these approaching calamities are not likely to have their equanimity ruffled by any suggestion that they should bestir themselves to make use of the same operations of nature—birds, animals, winds, and floods—to help them in establishing a really good fodder grass. I hope, however, there will still be many who will make an effffort to benefit themselves, and benefit the country, by a persistent attempt to establish paspalum dilatatum throughout Australia.

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THE SUGAR INDUSTRY IN CUBA.

CONGRESSIONAL COMMITTEE ON WAYS AND MEANS.

Friday, January 24, 1902.

The committee met at 10 o'clock a. m., pursuant to adjournment, Hon. S. E. Payne in the chair.

Statement of Mr. William Haywood, of Washington, D. C., representing the Hawaiian Sugar Planters' Association and the Chamber of Commerce, of Honolulu, against reciprocity with Cuba.

Mr. Chairman and gentlemen of the Ways and Means Committee: My name is William Haywood. I was for three years, prior to the annexation of Hawaii, United States consul-general at Honolulu, and upon the extension of American laws to the islands was appointed collector of internal revenue. I resigned this position last winter to come to Washington as the resident attorney of the Hawaiian Sugar Planters' Association.

Mr. Atkins made several references last week to a delegation from the Sandwich Islands. I am that delegation.

Hawaii being, as it were, the infant of the American family, is naturally diffident in making suggestions regarding legislation of national importance. She is not opposed to Cuba being assisted if Congress in its wisdom decides that the United

States is morally responsible for Cuba's welfare. When Hawaii sought and obtained the blessing of American citizenship she expected, and was willing to bear, her share of the burdens of citizenship. She is perfectly willing to stand her share of the expense of helping Cuba, but with her limited means and small population she naturally objects to being plunged into bankruptcy that Cuba's absentee sugar planters may be put on a more favorable footing than she. From all that I can gather, about 90 per cent of those who will profit by a lowering of the duties on Cuban sugars are Spanish and Americans.

To give to Cuba a free market for her sugar will be to give an alien people just as much advantage as American citizenship gives to Hawaiians, and the extra advantage of not being obliged to conform to the stringent laws regarding labor and immigration. With annexation Hawaii lost her best source of labor supply—China. The islands are so isolated that labor does not naturally come to Hawaii, but must be sought. Prior to annexation she could assist immigration and protect herself by making a contract. All those advantages she gave up for what she though a free, protected market. The prohibition against importing Chinese and the laws against assisted and contract labor has added greatly to the cost of producing her one, and I might say only, staple. It must be borne in mind that Hawaii produces practically nothing that she uses. All her food, clothing, machinery, and in fact everything but a few vegetables, come from the States, and the only thing she has to pay with is sugar.

Hawaii, with an area approximately of 80,000 acres of land suitable for the cultivation of sugar cane, produced last year, sold in the American market, 360,033 tons of raw sugar, valued at $27,093,923.41, which was 96.22 per cent of her total exports of every description—$28,054,430.43.

I might say right here that the annexation commissioners, when asked whether the limit of sugar production was reached, placed 80,000 acres as the total area of land suitable for sugar. They only have 80,000 acres in sugar now. We are producing more sugar than Mr. Thurston told Congress he thought we would, but we are doing it because new methods are being devised every day for increasing the output of the mills.

The Chairman. What was the price per pound?

Mr. Haywood. We figure everything in short tons in Hawaii, and it is almost impossible for me to give anything in pounds.

Mr. Newlands. What do you mean by short tons?

Mr. Haywood. 2,000 pounds.

The Chairman. Do you not know the price at which raw sugar is sold?

Mr. Haywood. It fluctuates with every steamer.

The Chairman. And it fluctuates in Hamburg, too. I would

like to know the relation of the price in Hawaii to the price in New York?

Mr. Haywood. As I understand it, several plantations in Hawaii made a contract to sell their sugars for three years at the price in New York. The day the cargo arrives there that price is fixed, as I understand it, and, as the committee has been told in the last several days, by the price of sugar in Hamburg.

The Chairman. As you understand, they get their full price for their Hawaiian sugar?

Mr. Haywood. They get the full price that sugar is selling for in New York as soon as sugars arrive there.

The Chairman. And how long has that been?

Mr. Haywood. Those contracts?

The Chairman. Yes.

Mr. Haywood. Since I first went there, about five years ago.

The Chairman. So, notwithstanding the fact that the American sugar trust is the only customer of the Hawaiian sugar that gets a full price for it?

Mr. Haywood. They get the price the day the sugar arrives in New York, whatever that may be.

Mr. Oxnard has just made a suggestion that we do not get the same price for our sugar in San Francisco. I think it is three-sixteenths less in San Francisco than the price paid for the sugar that goes to New York.

The Chairman. What proportion of the sugar goes to San Francisco?

Mr. Haywood. I do not think that the greater portion goes there; I think the great portion goes to New York.

The Chairman. Since you have been producing more?

Mr. Haywood. Yes, sir.

The Chairman. More than the Pacific coast needs?

Mr. Haywood. I presume so; yes, sir.

Mr. Long. What is the reason for the difference of three-sixteenths?

Mr. Haywood. As I understand it, the reason given by the purchasers is to cover freight.

Mr. Long. Freight from San Francisco?

Mr. Haywood. From San Francisco to New York. I am answering these questions from my own opinion.

It is impossible to state exactly what she purchased from the mainland last year because since June 14, 1900, at which time Hawaii was ushered in as a Territory under American rule, no entry of goods has been required when shipped to or from the mainland; but a fairly accurate estimate based on the official figures for 1899 places the imports in round numbers at $22,000,000.

From the above figures it will be seen that our little Territory is a good customer of the mainland and that she relies entirely on the proceeds from her sugar to pay her bills.

Hawaii bought last year from the States $142.75 worth of goods for each man, woman, and child on the islands. Cuba to do as well would have to purchase $225,000,000 from us.

All my adult life has been spent in the consular service of the Government. I have done my share working for additional foreign markets for American goods, and I appreciate how important it is, but in working to that end it is not good policy to sacrifice a sure home market. With annexation came a big boom in sugar. The people believed that a protected market was assured, and were willing to invest large sums of money in increasing that industry. New plantations with an aggregate capital of $25,000,000 were started, and old ones enlarged. The people have been struggling manfully for the past three years to meet the assessments on their stock to pay for the immense amount of plantation machinery bought in the States, and now wish to enjoy the rewards for their confidence in American protection.

Hawaii can not produce sugar as cheaply as Cuba. I wish I had the report for last year of all the plantations, so I could state what the average cost was. I have, however, as a stockholder, recently received the annual reports of three plantations, the figures from which will give a fair idea of the cost of producing sugar in Hawaii. These plantations are three of the best of the islands and are fair representatives of the different kinds. Oahu is a large estate situated on the island of Oahu, and is what is known as an irrigated plantation. Four million six hundred thousand dollars has been invested in this plantation. The other two, Honomu and Wailuku, are smaller estates, one situated on the island of Maui, and the other on Hawaii. Both of these plantations are among the oldest, and are fully developed.

Oahu last year produced 21,450 tons of sugar, for which it received $1,418,421.86, or $67.30 per ton. The operating expenses are $1,016,366.08, or $47 per ton, a net profit of $19.30 per ton. The duty on 96 per cent is 1,685, about $33.70 per ton. Take this protection away and every ton of sugar produced by this plantation last year would have been at a loss of $14.40.

The Chairman. That is if you take all this protection away?

Mr. Haywood. Yes, sir.

The Chairman. If you took half of it away it would leave quite a profit—$5 a ton.

Mr. Haywood. I will state right here that these figures are based on the actual cost to produce the sugar in Hawaii. To that must be added freights, and our plantations do not charge anything for deterioration of plant.

The Chairman. That is not the net price them, that you have stated?

Mr. Haywood. It is what it costs the plantation to produce the sugar.

The Chairman. Have you deducted the cost?

Mr. Haywood. I unfortunately did not have those figures to add, and I preferred to make a poorer case than to state something I could not substantiate.

The Chairman. Can you give an estimate?

Mr. Haywood. Of deterioration?

The Chairman. Yes.

Mr. Haywood. No, sir; I am afraid I can not.

Mr. Long. That is upon the assumption that sugar in New York is 1.685 lower in price on account of the duty being taken off?

Mr. Haywood. Yes. The argument of protection is that it raises the price just that much. That is what we have to contend with with the opponents of protection.

Honomu produced last year 4,402 tons, receiving $342,228.05, or $77.27 per ton, and its operating expenses were $282,874.35, or $64.26 per ton; net profit of $13.01 per ton. This plantation without the protective duty would produce its sugar at a loss of $20.67 per ton.

Wailuku states in its report for last year that the cost of producing a ton of sugar was $46.41. The average cost of these three plantations was $60.10 per ton. I have not picked out three of the worst plantations; I have given you the figures from all of the reports I have. I am sorry that I can not furnish the average cost of all the plantations, as I feel confident the figures would be substantially the same.

I do not wish to be understood as claiming that this state of affairs has always prevailed in the islands, or that Hawaii will always need the present protective duty. Prior to the extension of the American labor and immigration laws sugar was produced much more cheaply than now. Personally, as a stockholder, I have confidence in the business ability of those who have been trying to solve the problem of raising crops with 75 per cent of the labor needed. Give them time, and I am sure they will find some spot on this earth where labor can be procured at a fair price. What we do ask is that we are not made to compete with a country at present more favorably situated than Hawaii.

One of the gentlemen who spoke last week mentioned the fact that this concession to Cuba would mean a great profit to American shipping. Hawaii has the proud distinction of being the one territory in the world where American shipping predominates. I have not the figures for the past year, but in a report I made to the Department of State on the shipping of the islands for 1897 I showed that 82 per cent of the products of the islands was carried in American bottoms. The New York Mail and Express of March 3, 1898, commenting on my report, said:

"These figures present an argument which the business judgment of the House can not resist. They show that Hawaii is the one territory in the world where American commercial

influence is not only supreme, but steadily advancing. The expansion of trade interests in the Pacific Ocean which is sure to follow the great international projects now under way in the Far East will increase the volume and value of Hawaii's commerce every year. Hawaii is bound to become the central depot of this vast traffic, and the nation which controls that port will enjoy a position of almost incalculable advantage in the trade between Asia and Europe."

Hawaii exchanged these advantages for a free protected market. I do not believe Cuba can offer as much. If Cuba needs charity, give it to her as such, but not in the form of concessions to absentee landlords. Remember the familiar proverb, which is best expressed by the French, "Well-regulated charity begins at home."

Will the free entry of Cuban sugar hurt the Territory of Hawaii? I believe it will. Cuba in 1894, without a free market and under Spanish misrule, found it profitable to produce 1,100,000 tons of sugar at a profit of 10 per cent, and, according to a statement made by Mr. William Bonnet (p. 527, Cuban Census), "could have ground more than that had it not been for the war."

If she can do so well under such adverse circumstances as prevailed at that time, what will she produce when she is put on more than an equality with the American planter? Listen to what Mr. Robert P. Porter, special commissioner from the United States to Cuba, says about the possibilities of Cuban sugar. You will find it on page 525 of the Cuban Census.

With millions of acres of the richest and best cane land on the globe yet untouched by the plow, with a climate unsurpassed for the growth and development of sugar cane, and with a prestige for Cuban sugar second to none in the markets of the world, the future of Cuba's sugar presents a possibility of wealth surpassing the richness of the gold and silver which came to Columbus in the marvelous tales of the interior of the magnificent island which he had discovered.

I could quote opinions like the above by the score, but it seems unnecessary to consume your time to prove what is patent to everyone who has studied Cuba's agricultural possibilities. With free markets she can supply the world, or, as the compiler of the Cuban Census says in the concluding paragraph of the article on sugar:

The rehabilitation of the large plantations will require much time and considerable expenditures, but with the liquidation of existing loans on rural property, the establishment of banks, and a stable financial system, a repetition of the crop of 1894 may soon be expected, with larger ones to follow. Indeed, when we consider that this crop was cultivated on less than one-fourteenth part of the area of the island (28,000,000 acres), a large part of which can be made suitable for sugar, some idea of its great prospective wealth in this commodity

can be formed, provided Cuba is successful in finding favorable foreign markets. In short, it is perfectly apparent, as has been elsewhere stated, that under such conditions Cuba can easily become the greatest sugar-producing country in the world.

Having shown, as I believe, that the free introduction of Cuban sugar will so stimulate the production as to glut the American market with free sugar, let us see how Hawaii could stand the taking off of all the duty. We have as a guide the experience the Hawaiian planters went through during the time sugar was free under the McKinley bill.

The United States minister to Hawaii, in a dispatch to the Secretary of State, No. 32, of September 5, 1891, said:

The repeal of the sugar duty by the United States has struck the principal material product of Hawaii a very severe blow, and with the most favorable estimate it now looks as though bankruptcy must be the inevitable fate of more or less of the sugar-planting firms and corporations.

In confirmation of what I have stated regarding the cost of producing sugar in Hawaii, I quote from page 769 of the Senate Committee on Foreign Relations' report on the Hawaiian Islands. The witness, Mr. Simpson, says:

When I was in Honolulu the winter of 1892 the growing price of sugar was about $90 per ton. The cause of that was that the previous crop of Cuban sugar had been practically a failure and they were enabled to get a much better price than they are getting at present. The last quotations which I received from Honolulu they were paying for Hawaiian sugar laid in San Francisco 2⅛, almost the lowest price it has ever reached, and which price does not pay even a small interest on the investment.

In conclusion I wish to impress upon the committee the fact that Hawaii no longer enjoys cheap labor. In fact, she has been put to her wits end during the past two years to obtain sufficient labor to take off her crops at any price. Last spring the Planters' Association tried the experiment of bringing labor from Porto Rico. Two thousand one hundred were imported at a cost of about $400,000. It cost one plantation $1.56 per ton of sugar raised to obtain this labor. Hawaii is compelled today to pay for the most indifferent labor more than is paid in the States, while skilled labor is paid a much higher wage than union labor demands here.

Mr. Atkins, in his talk before the committee, speaks about the cost of producing sugar in Hawaii, and he was very careful to read from the printed report of the Ewa plantation, the plantation that is the wonder of the sugar world for producing sugar. And it was not only not the report for last year's proceeding, but for two years before the plantations of Hawaii began to feel the effects of the scarcity of labor. Ewa stands alone. She produces her sugar much cheaper than the other 54 plantation, but it brought to my mind the idea which I

would like to submit to the committee, and that is, that before annexation Hawaii did produce her sugar very cheap. She produced it just the same way that Cuba could produce it now if she was given free trade and at the same time allowed to have her own labor laws. So far as I know, she may have a law down there like the Porto Ricans have—to clap a man and put him in jail if he dares attempt to organize labor. I was told yesterday by a gentleman who had been to Hawaii that some sugar planters had told him—he was there two or three years ago, I believe—that the Ewa plantation produced its sugar at $30 a ton. Now, that may be so, I have not the figures.

Mr. Long. That is a cent and a half a pound?

Mr. Haywood. Yes. But I can understand why they produced it that cheap. That plantation was the first irrigated plantation to be started.

Mr. Long. That is raw sugar?

Mr. Haywood. Yes; and these arid lands up to that time were worth practically nothing. She had the choice of those lands, and naturally took the ones at tide water. All she had to do was to sink a well, not very deep, and it cost very little to pump water up. This plantation, the Oahu, was started just after Ewa, with lands just adjoining, but at a higher altitude. They now pay $30,000 a month alone for coal to be used to pump that water up. We are trying to experiment on the islands to use petroleum to see if that cost can not be reduced; but it shows that with identically the same land—two plantations side by side— that it is not possible for all of them to produce the sugar as cheap as Ewa. I do not believe that if these figures were watched, with the other 54 plantations on the islands, it would make much effect on the average cost of producing sugar on the islands.

Mr. Long. And what is that average?

Mr. Haywood. $60.10 on these three plantations I have the figures for. I do want to emphasize, though, that it being annexed and having to comply with the American labor and immigration laws, the cost of producing sugar is greatly enhanced in the islands; and it has added another difficulty to us, and that is knowing where to get labor at any price. It is no bluff on the part of plantations when they pay $400,000 to bring $2,100 men, women, and children from Porto Rico. When you know they did this you will know they needed labor pretty bad.

Mr. Newlands. That would be $200 for each person?

Mr. Haywood. Yes, sir.

The Chairman. Is there any advantage in Cuba over Hawaii in raising sugar?

Mr. Haywood. Yes, sir.

The Chairman. Except the labor question?

Mr. Haywood. Yes, sir.

The Chairman. What is the other?

Mr. Haywood. Nearer to the market.

The Chairman. I say the cost of producing sugar.

Mr. Haywood. Yes, sir. We are in the same position with the Louisiana people and the beet-sugar people. We can not under our laws secure labor——

The Chairman. I say aside from the labor question what other advantage has Cuba?

Mr. Haywood. Another thing is it costs us more. Our isolation costs us more for everything we use. We produce nothing we use; it has to be brought from the mainland.

The Chairman. That is a matter of trade.

Mr. Haywood. Yes, sir; and profits. We pay profits to another person instead of raising the thing or producing the thing ourselves.

The Chairman. Is there any natural condition wherein Cuba has an advantage over Hawaii?

Mr. Haywood. Yes, sir; we do not have the broad acres that Cuba has. Our arable land runs up into narrow gorges, making it hard to cultivate; it is in patches. While we have the best machinery and steam plows for plowing, yet in a number of places it has to be dug up with a hoe because we can not use a plow. The cost of clearing land in Hawaii is something erormous—I think from $60 to $70 per acre. It is full of stones which have to be taken out.

The Chairman. Has Cuba any other advantage?

Mr. Haywood. No, sir; in every other respect I think we are a favored spot.

The Chairman. Would the slightest reduction in the sugar duty from Cuba ruin the Hawaiian interests?

Mr. Haywood. No, sir; I do not think so.

The Chairman. How much reduction could they stand without being ruined?

Mr. Haywood. That is an embarrassing question. I do not know; but I will say this——

The Chairman. Make it safe.

Mr. Haywood. Ten per cent.

The Chairman. You think you could stand that much?

Mr. Haywood. I think we could stand that, but here is the point I would like to make. I do not know whether it is feasible or not, and you gentlemen are experts on tariff legislation. Mr. Pavey, I think, who was the lawyer who presented a brief here to the committee, states somewhere in his brief that even if Cuba was given free entry into the United States for her sugar, what she produced would be less than what we have to buy outside, and therefore would not affect the price of raw sugar in the United States. Let us take him at his word, and if Congress decides to give a reduction limit that reduction, say to $850,000, so as to make sure that Congress will not

dump in here on equal terms with the United States all the sugar that we consume.

The Chairman. Did the sugar production in Hawaii increase or decrease during the period from 1894 to 1897?

Mr. Haywood. It has been increasing right straight along.

The Chairman. It has increased during those two years?

Mr. Haywood. Yes, sir.

The Chairman. No difference in the increase during those years?

Mr. Haywood. Yes; I think so.

The Chairman. I mean the proportion of increase?

Mr. Haywood. Yes, I think it has increased more since annexation.

The Chairman. From 1894 to 1897?

Mr. Haywood. Oh, no, sir; I do not think there was any increase then.

The Chairman. Were there any failures?

Mr. Haywood. I do not know; I was not there.

The Chairman. Have you statistics there that will show whether there was an increase or not?

Mr. Haywood. Yes, sir; I think so.

The Chairman. If you have them handy you can put them right in the hearings.

Mr. Haywood. Yes, sir; I have it all down here from 1875.

The Chairman. Do not go back that far; go back to 1891.

Mr. Haywood. In 1891, 274,983 pounds. The next year, 1892, there was a decrease—263,639 pounds. In 1893 there was a considerable increase—330,000 pounds. In 1894 there was a decrease—306,000 pounds.

The Chairman. You are giving the amount of sugar produced each year?

Mr. Haywood. Yes, sir; 1895, 294,000 pounds; 1896, 443,000 pounds; 1897, 520,000 pounds; 1898, 445,000 pounds; 1899, 445,000 pounds; 1900 and 1901 I can not give.

The Chairman. Very well. Then there was a substantial increase during the years that I have indicated?

Mr. Haywood. Yes, sir.

The Chairman. Still, the duty on sugar was 40 per cent ad valorem during those years?

Mr. Haywood. Yes, sir.

The Chairman. Your industry not only stood that duty, but shows a large increase?

Mr. Haywood. Yes, sir.

Mr. Newlands. The price was higher during that time, was it not?

Mr. Haywood. Yes; very much higher.

Mr. Newlands. The international price was higher?

Mr. Haywood. I will tell you another thing, and Mr. Newlands knows this, for he has studied the political situation in the islands. The overthrow had occurred, and it seemed to people out there that annexation would follow. That invited

more capital. Alot of the plantations had taken out their 6-roller mills and put in 9-roller mills, and the production of sugar, the extraction, was higher.

The Chairman. Hawaii did not get the bounty under the McKinley bill?

Mr. Haywood. No, sir.

The Chairman. So you ran in competition with free sugar?

Mr. Haywood. Yes, sir; but then we had the advantage over American producers, as I said, by getting cheaper labor than we can get now. There is just one other point——

Mr. Newlands. Are you through with your statement?

Mr. Haywood. One more thing. I have shown that we buy everything in the United States. The manufacturers of those articles receive a high protection. We pay probably $7,000,000 or $8,000,000 protection alone on what we purchase on the mainland. Now I ask, is it fair, when we only produce one article, to wipe away all that protection and then make us pay the higher price for everything that we buy from the States?

The Chairman. That is on the theory that free trade in sugar is to be granted. You speak of wiping away all the protection that you have.

Mr. Haywood. That is what we fear. I would not bother with 10 per cent——

Mr. Newlands. Do you men to say, Mr. Haywood, that the people of Hawaii pay $7,000,000 or $8,000,000 more for these things that they consume by buying them in a protected market than they would have to pay if they were able to resort to the markets of the world?

Mr. Haywood. I am afraid I am not much of an expert on that, but I looked through the tariff schedules last night and picked out the articles that we consume the most of, such as machinery, clothing, groceries, boots and shoes, and the heavy items, and then I took an average, and assuming that the price paid was equal to the duty——

Mr. Newlands. In addition?

Mr. Haywood. Yes.

Mr. Dalzell. Is that your theory of protection?

Mr. Haywood. I hope it is.

Mr. McCall. For instance, boots and shoes that you mentioned. Do not we make those cheaper than they are made abroad?

Mr. Haywood. Yes. I would not wear a foreign shoe, either.

Mr. Dalzell. How did you raise your revenue in Hawaii before annexation?

Mr. Haywood. On land and internal taxes.

Mr. McCall. You did not have any system of custom-house duties?

Mr. Haywood. Yes, we did. There was a preferential duty in favor of the United States. The duty on a good many of

the goods in the United States was 10 per cent, and almost prohibitory from other countries.

Mr. McCall. So really you were under a tariff duty before annexation?

Mr. Haywood. Yes.

The Chairman. You have bought principally from the United States for thirty years, pretty largely?

Mr. Haywood. Yes; practically since the American missionaries first went there.

Mr. Long. Have you been paying higher for those supplies since annexation than you paid before?

Mr. Haywood. I have not been there for a year. I was there last summer for a few days and some of the managers told me that supplies were higher, but that was more because of the great prosperity and higher prices generally.

Mr. Long. And not on account of the tariff?

Mr. Haywood. No. In a good many cases now supplies are cheaper because there is no duty, whereas before the Hawaiians had to pay the Hawaiian Government 10 per cent. Now they get those goods free.

Mr. Oxnard asked about steam plows. We used to buy steam plows from Fowler, of England, because in the United States they did not make a steam plow that ran on a cable. All our steam plows were hauled across the land by traction engines, which was not feasible. The American Sugar Company, which started just after annexation, got a concern which has sent a man out to the islands and studied the question, and we bought all our plows from that concern. And I will say that I think we got them at the same price and got them in half the time that it would have taken Fowler to have sent them.

The Chairman. The steam plow is cheaper, I suppose, than the old-fashioned plow?

Mr. Haywood. Yes, sir.

The Chairman. Do you know whether they use steam plows in Cuba or not? You gentlemen seem to be informed on that subject.

Mr. Haywood. No.

Mr. Newlands. You say the number of acres planted in sugar amounts to 80,000 acres, and that the total product is 360,000 tons, aggregating $27,000,000. That would be a little less than $80 a ton, would it not?

Mr. Haywood. That is a little hard to calculate mentally.

Mr. Newlands. On an average what do you understand to be the cost of sugar a ton on those islands?

Mr. Haywood. I said that from the three reports of the three plantations it shows the cost was $60.10. That would be a fraction over 3 cents a pound.

Mr. Newlands. Do you know what value sugar lands have in Hawaii?

Mr. Haywood. They have increased wonderfully since annexation.

Mr. Newlands. Do you know what the prevailing price was prior to annexation and what it has been since annexation?

Mr. Haywood. No; I do not know what the price was before annexation. Of course the value of land was fixed by its use and what it produced. You see, we have some lands—now, the Ewa plantation has a little pocket about the size of this room and it costs a great deal to dig that up, but they do it because I think they raise at the rate of 14 tons per acre in this little pocket. The United States has just condemned a lot of land on Pearl Harbor for the use of a naval station. That land is now in growing cane and the jury returned a valuation of $75 per acre for that land.

Mr. Newlands. Are there not some sugar lands in Hawaii that run as high as $500 an acre in value, and even higher?

Mr. Haywood. I do not know, sir.

Mr. Newlands. About how many laborers are employed on all the sugar plantations of Hawaii?

Mr. Haywood. Just a fraction under 40,000.

Mr. Newlands. That is about one-third of the total population, is it not?

Mr. Haywood. Pretty nearly a fourth. There are about 150,000 people there.

Mr. Newlands. Of what nationality are those laborers?

Mr. Haywood. On the plantations?

Mr. Newlands. Yes.

Mr. Haywood. There are 1,460 Hawaiians, 2,417 Portuguese, 27,531 Japanese, 4,972 Chinese, 2.095 Porto Ricans, 46 South Sea Islanders, and 1,046 of other nationalities.

Mr. Newlands. How many Hawaiians did you say?

Mr. Haywood. 1,460.

Mr. Newlands. And what is your next item?

Mr. Haywood. Portuguese, 2,417.

Mr. Newlands. How many native Hawaiian laborers are there in the Sandwich Islands?

Mr. Haywood. That I can not tell. There has been an effort out in the islands not to draw distinctions between the whites and the Hawaiians, and taking the last census we did not divide them except by parentage.

Mr. Newlands. How about the previous census?

Mr. Haywood. I have not that, unfortunately.

Mr. Newlands. How many Hawaiians in all of the islands?

Mr. Haywood. Forty thousand, I should say.

Mr. Newlands. Is it fair to say that one in five of them is a laboring man?

Mr. Haywood. Well, yes, sir.

Mr. Newlands. That would make 8,000 laborers?

Mr. Haywood. Yes.

Mr. Newlands. Why are there not more Hawaiians employed on the plantations?

Mr. Haywood. Because we give the Hawaiians the very best labor we have to perform. They do the stevedoring work and they drive and they work on the stock ranches. They are particularly fond of horses and they are valuable——

Mr. Newlands. They are employed as a rule in other vocations, then?

Mr. Haywood. Yes, sir; and on the plantations I doubt very much if you would find a manager who would ask a Hawaiian to irrigate or strip or cut cane.

Mr. Newlands. Why is that—because it is regarded as an inferior class of labor?

Mr. Haywood. Yes, sir; it is harder and we do not pay as much for that labor.

Mr. Newlands. For that class of labor what is paid in the Hawaiian Islands?

Mr. Haywood. I will give you what I read in a recent publication from Hawaii. It gave a report of the plantations. It was this: Oahu, skilled labor paid a wage of $85 per month. Everything is skilled but the men who work in the irrigating ditches and strip the cane. Those men are almost entirely Asiatics. They get $20 per month and receive their house rent and fuel, free water, exemption from taxes, free medical attendance——

Mr. Newlands. Do they receive their food?

Mr. Haywood. No, sir.

Mr. Newlands. Do they pay for that?

Mr. Haywood. They pay for it, but get it at almost cost.

Mr. Newlands. Twenty dollars a month, then, they receive in addition to these other appurtenances?

Mr. Haywood. Yes, sir; and that amounts to almost $30 altogether.

Mr. Newlands. You say you have about 30,000 Japanese and Chinese there. How do they live on these plantations? Are they in barracks?

Mr. Haywood. No, sir.

Mr. Newlands. Do they live with their families?

Mr. Haywood. No, sir.

Mr. Newlands. How is it?

Mr. Haywood. Our houses on the plantations are built for two families: it is a double house, with a plat of land around it on either side. It is hard for the physicians on the plantations to keep the laborers from herding together, and we try to keep them separate for sanitary reasons.

Mr. Newlands. Take this large plantation that you speak of, this largest one. How many such laborers would be upon that plantation?

Mr. Haywood. Fifteen hundred men on Oahu, 500 on Wailuku, and 575 on Honomu.

Mr. Newlands. What is the reason of the disproportion between the Japanese and Chinese in those islands?

Mr. Haywood. Because we have not received any Chinese

now for seven or eight years and they have been going back, and we have lost them without receiving any in return.

Mr. Newlands. That diminution started under our Chinese-exclusion laws?

Mr. Haywood. No; just after the overthrow. Its constitution started off by saying that it was only to remain in power long enough to obtain annexation to the United States, and then fearing that having a law on their statute books permitting Chinese to come in, which was so contrary to the sentiment of the American people, would be against them, they copied almost exactly the Geary law.

Mr. Newlands. And thereafter you resorted to the Japanese labor?

Mr. Haywood. Yes.

Mr. Newlands. Is that as satisfactory as the Chinese labor?

Mr. Haywood. I do not wish to criticise the bridge that carries us over—it is the only labor we have—but I would answer no to that question; it is not. The few remaining Chinese get considerably more than the Japanese, because the managers like them better. I would like to say that we have tried the profit-sharing system——

Mr. Newlands. With the laborers?

Mr. Haywood. Yes, sir. It has proved very satisfactory, both to the plantations and to the laborers. Those laborers who work that way receive on an average from $1.25 to $1.50 a day for their labor, and the plantations like it better than hiring them by the month at $20 per month.

Mr. Newlands. Do you have any difficulty in getting laborers from Porto Rico to go there?

Mr. Haywood. No: I think not.

Mr. Newlands. But it cost you about $200 a head to get them there?

Mr. Haywood. Yes, sir.

Mr. Newlands. Is not that a very large sum for steamship travel and to get across the Isthmus of Panama?

Mr. Haywood. When we first got them, they had no clothes; they had to be furnished with clothes; and after we got them to Honolulu, which does not figure in this $400,000, I understand, they had to be fed for about three months because they were so emaciated when they arrived that they were not able to work. Really the benefit of bringing Porto Ricans has been the moral effect on the other labor. As has been said here, the average Asiatic laborer who gets a dollar does not care about working. He can live under a fig tree and pick his breakfast off the limbs in the morning.

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THE FORESTS OF RUSSIA.—The gradual deforestation of Russia is attracting increased attention throughout the Empire, and the Forestry Society, as well as the forestry department of the Ministry of Agriculture and Domains, are discussing means for regulating the consumption of timber and for pro-

pagation. "Wooden Russia," as it is familiarly called, does not appear to be in any immediate danger, as a recent official report states that forests in this country now cover a gross area of 188,000,000 hectares (464,548,000 acres). Among European countries, Sweden comes next, with 18,000,000 hectares (44,478,000 acres) of forest. In Russia, the forests cover 36 per cent of the whole imperial area. They have a greater importance for Russians than for people of West European countries, as villages and country houses are largely built of wood, stone and brick houses being almost unknown, and the forests furnish the main sources of fuel supply. While the imperial committee complains that it is private owners who are recklessly devastating the forests and urges that adequate laws and regulations be enacted to prevent this, the Forestry Society calls attention to the fact that, according to the official report of the forestry department of the Ministry of Agriculture and Domains, the Crown forests furnished a revenue of $9,064,000 in 1890 and $24,720,000 in 1899. It is claimed that this advance in nine years could not be due to the natural increase of timber growth, and it is urged that the Government set an example in moderation.—U. S. Consular Reports.

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CUBAN SUGAR COMPETITION.

The competition of Cuban sugar with the American product is a matter of vital interest to those engaged in the domestic industry. It involves the question whether that industry is to survive or perish. The estimated output of beet sugar in the United States this year is 400,000,000 pounds, which is 10 per cent of the annual consumption of sugar in this country. The progress of this industry has been rapid and there is reason to believe that if its development is not checked enough will be produced within ten years, together with the product of Hawaii and Porto Rico, to supply the home demand.

A great development of the Cuban sugar industry is to be expected. It is stated that the crop this year will be 600,000 tons, as against half that amount last year. The British Consul General at Havana, in a report to his government, expresses the opinion that next year's production of sugar in Cuba will reach at least 800,000 tons and that the annual output in a few years will amount to 1,500,000 tons, or nearly as much as was imported into this country last year. The consul general remarks that the question what Cuba will do with her increased crop looms up most prominently and adds that sooner or later she must enter the general markets with her sugar and compete with the product of the beet root. This he has no doubt she can successfully do when the development predicted takes place.

It is not the present expectation of the Cubans to enter the general markets with their staple product. What they are now hoping for is to obtain such concessions from this government as will enable them to sell practically all of their sugar in the American market. They probably do not expect that this market will be made free to their sugar, but that it will receive liberal consideration. The question to be determined is how far we can go in favoring Cuban sugar without detriment to the home industry, in which is now embraced the sugar of Hawaii and Porto Rico, the production of which in both islands can be considerably increased.

That question is likely to prove somewhat troublesome and it seems safe to predict that its determination will not be entirely satisfactory to the Cubans. There is a disposition to treat Cuba generously in a commercial way. That is felt to be an essential part of our obligations to the island. But we must at the same time give due consideration to our domestic interests. The development and prosperity of Cuba are a matter of very great importance to this country and we should seek to promote these by every means not detrimental to our own industries and the welfare of our own people.—Omaha Bee.

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CUBA'S IDEA OF RECIPROCITY.

The Cuban cat is now fairly out of the bag and proves to be a projected raid on the American pocket-book compared with which all that we have hitherto spent for the Cubans would be a mere trine. What they want is absolute independence and no nonsense about it, and perfect freedom of access to our markets. If they cannot get entire freedom they would grudgingly agree to pay a nominal duty on their sugar and tobacco. It is evidently the opinion of the inhabitants of Cuba that if we were fools enough to go to war for them we can be induced to support them in luxury ever after.

The United States imported in 1899, 3,980,250,569 pounds of sugar, which paid a duty of $61,428,331. In 1894 we received from Cuba alone 2,127,497,445 pounds, and in the same year she exported to Spain and the United Kingdom very large quantities. Cuba could supply every pound of sugar consumed in the United States, and if her present modest request were granted would come very near doing it. If we maintain the duty on other imported sugar our experience with Hawaii under the reciprocity treaty proves that the Cuban planter would receive every dollar remitted—which would otherwise go into our treasury—without reducing the price to consumers in the least. The Cubans must think we need them badly. The amount they ask us to present to them in the shape of remitted sugar duties is about $60,000,000 a year. The exact sum they would gain from tobacco remissions

would be hard to tell, but under normal conditions we import about 20,000,000 pounds, mostly from Cuba, upon which the duty is from $1.85 to $2.50 per pound for wrappers and from 35 to 50 cents a pound for fillers, besides a good many cigars. There would be at least $10,000,000 a year lost to the treasury if the Cuban request were granted. Altogether there would be about $70,000,000 of an annual present to the sugar and tobacco planters. It is true that they offer us in exchange some market for our flour and other things, most of which they buy of us anyhow, but our experience with Hawaii shows that under such an arrangement we should pay them three or four dollars for every one which they would pay us, besides maintaining a fleet in their waters to scare away the bugaboos.

It is such an absurd proposition as this which we are asked to consider in behalf of a foreign country whose people hate the very sight of us. The reciprocity treaty with Hawaii benefited only those who were exploiting that kingdom. As foreigners they had no right to it. As citizens of the United States we rejoice in their prosperity. We desire, and the people of the United States will insist, that the people of the Philippines be put upon precisely the same commercial basis as the people of Hawaii. They make some sugar themselves and can make more. When we see how far our own people can go in supplying our demands it will be quite time enough to talk about Cuban sugar.—S. F. Chron.

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Generosity Should Begin at Home.—If sentiment and not reason is to control, let our feeling go out to our own people. He that provideth not for his own is worse than an infidel. The Cubans in past years have been as prosperous as other foreign sugar producers. They have for years contended against bounty-aided beet sugar. This much we have already done for them, that we have met the bounty by a countervailing duty. They do not meet that bounty in the United States. They compete here on even terms with other unaided foreign producers. And if, with that advantage and cheap freights and quick time to a great market, the Cubans cannot live on their rich soil, we are sorry for them, but object to supporting them, and especially to driving our own citizens out of the sugar business for their benefit and that of the refining trust.—S. F. Chron.

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TO CHEAPEN SUGAR MANUFACTURE.

Captain D. G. Purse will go to New Orleans during the Mardi Gras festivities to witness a test of the Century Evaporator, which, it is claimed, is destined to revolutionize sugar manufacturing. A 200-ton evaporator is being built in New

Orleans and its test will be witnessed by sugar planters from Louisiana and other southern states where cane is grown.

The Sugar Planters' Journal says:

"The manufacturers of the Century Evaporator claim it will enable a sugar house to be built for much less money than is now generally required with the vacuum pan and effect system. They likewise claim that their apparatus will allow of a ton of cane being manufactured for 25c. instead of $1.25 to $1.50, the present average cost.

"Should their system do all that is claimed for it, a complete revolution will be effected in general sugar house manufacture, for if it be installed it is promised that all the effects and vacuum pans, with their different pumps, will be discarded. The coal boilers, too, will share a similar fate, for the boiling of the juice and the other working of the house is expected to be done by bagasse as the only fuel. The inventor, Mr. O. M. Nilson, a practical sugar planter of much experience, claims for his evaporator: No entrainment, no inversion of sugar, ten times better circulation, and numerous other points of advantage over the system now in vogue."

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THE END OF THE BOUNTIES.

Contrary to expectation, the Brussels sugar conference has led to a definite result. A convention was agreed upon, the chief feature of which is that sugar bounties shall be abolished and countervailing duties introduced against all bounty-fed sugar.

There is, of course, a possibility that the agreement will not be ratified by the various governments concerned, but it is no more than a possibility. The probability is in favor of ratification. The sugar interests of Germany, Austria and France naturally will oppose ratification and will exert their powerful influence to prevent legislation intended to carry out the convention. It is not likely they will be successful, however. While the sugar interest is a powerful one, and is backed by strong agricultural influence, there is no doubt that the various governments have long been tired of the bounty system, which is a serious drain upon their exchequers and maintains abnormally high prices for sugar to the domestic consumer, while cheapening it to foreigners, besides being a constant source of irritation in their foreign relations. It is difficult to believe that the people at large will hasten to the rescue of a system which makes sugar a luxury to them, while it enables other nations to use it in plenty.—Lou. Planter.

Record of Temperature for 1901 in Honoulu, Territory of Hawaii, Kept by W. R Castle, Altitude 50 Feet

Day of Mo.	JAN.			FEB.			MAR.			APR.			MAY			JUNE			JULY			AUG			SEPT			OCT			NOV.			DEC.		
	A.M. 6	P.M. 1	P.M. 9	A.M. 6	P.M. 1	P.M. 9	A.M 6	P.M. 1	P.M. 9	A.M. 6	P.M. 1	P.M. 9	A.M. 6	P.M. 1	P.M. 9	A.M. 6	P.M. 1	P.M. 9	A.M. 6	P.M. 1	P.M. 9	A.M. 6	P.M. 1	P.M. 9	A.M. 6	P.M. 1	P.M. 9	A.M. 6	P.M. 1	P.M. 9	A.M. 6	P.M. 1	P.M. 9	A.M. 6	P.M. J	P.M 9.
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27	69.5	76	69	65	78	71	69	79	67	71	80	74	71.5	86	73	72	84	76	75	83	76	74	84	76	71	83	72 5	73	82	76	69	79	66	68.5	77	69
28	65	77	68	66	78	68	63	75	63	63	80	70	70	82	74	76	85	74	75.5	85	76	76	84	76	70	84	75	76	83	76	65	79	68	67	73	67
29	66	77 5	69				67	78	70	68	80	72	72	82	75	73	85	76	75	84	76.5	76	86	78.5	68	83	73	75	78	77	66	78	69	67	71	66
30	64	77	66				66	83	72	72	78	69	72	83	74.5	75	85	76.5	73	83	76	78	86	78	68	84	74.5	72	86	78	65	78	65 5	66	71	66.5
31	62	74	66				73	81	74				68	84	73				72.5	82	76.5	77	85	77				73	88	76				66.5	72	66.5

Average Temperature, 1901

Jan	70.64°		May	75.41°	2.45	Sept	77.10°	
Feb	68.86°		June	77 45°	.98	Oct	75.72°	
Mar	72.74°		July	77.91°	.59	Nov	73 62°	
Apr	73.43°		Aug	78 55°	.54	Dec	71.60°	

Averages of Temperature for 13 Years.

1889	74.21°	1893	73.86°	1897	74.15°
1890	74.05°	1894	73.08°	1898	74 20°
1891	73.81°	1895	74.26°	1899	74.49°
1892	74.39°	1896	74.03°	1900	74.47°

1901	74.42
13 yrs	74.11

RECORD OF THE RAINFALL AT HONOLULU FOR THE PAST EIGHTEEN YEARS.

From Daily Reading at the Residence of Mr. W. R. Castle.

MONTHS.	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901
January	1.07	.06	.38	5 85	.78	.87	2.00	1.19	6.50	2.57	3.08	2.38	2.20	.94	3.97	.87	.41	2.44
February	1.68	.67	.94	13.04	1.98	.77	9.85	4.84	3.18	13.45	12.42	1.81	1.30	.79	7.60	3.55	.93	7.70
March	4.06	2.96	1.63	2.24	2.25	.38	7.83	.69	.29	.75	1.51	1.46	3.11	1.20	9.66	3.73	1.30	3.40
April	3.52	5.11	1.19	2.35	2.36	.94	4.84	.88	1.60	2.22	2.25	1.01	2.40	.93	1.26	.81	4.08	2.15
May	.44	11.56	1 61	4 10	1.97	.81	1.20	.23	5.10	1.50	.10	.93	1.51	.96	.68	1.44	1.06	2.45
June	.48	2.51	.63	.95	.47	.97	.86	.43	.67	.29	.59	.90	.78	.99	2.07	.68	.39	.98
July	1.40	4.27	.56	.67	.15	.48	1.30	.58	.53	.28	.45	.45	.00	.81	.63	.11	1.65	.59
August	.83	2.85	.43	1.02	4.22	1.16	1.00	.58	1.14	1.04	.08	1.41	1.33	.39	.58	1.04	1.40	.54
September	.32	1.17	2.26	.95	2.80	1.81	.60	.47	.42	.91	.56	2.15	.39	2.66	.15	.35	1.17	.47
October	4.66	.03	1.84	.44	1.31	.95	1.36	3.62	3.01	.64	1.76	.41	2.04	1.61	.52	3.70	7.08	3.56
November	.54	1.40	8.74	11.84	3.39	1.50	1.80	.39	.35	8.33	8.33	4.27	2.31	.88	.50	.19	12.72	2.90
December	3.76	3.14	3.47	6.37	18.08	2.82	1.64	1.50	3.97	1.30	2.41	12.02	5.54	.	.77	1.95	1.06	9.50
Totals	22.76	35.73	23.68	49.82	39.76	13.46	34.28	15.40	26.76	33.28	33.54	29.20	22.91	13.67	28.39	8.42	33.25	36.70

Average for 18 years 28.39 inches. Maximum, 49.82 inches; minimum, 13.46 inches.